



University of Venda
Creating Future Leaders

**DIGITAL FRAMEWORK FOR REDEFINING SOUTH AFRICAN LOCAL GOVERNMENT
SERVICE DELIVERY.**

By

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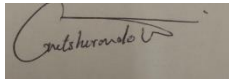
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DECLARATION

I, Vusani Netshirando, student number:11574897, hereby declare that this PhD research in Business Information Systems titled “Digital Framework for Redefining South African Local Government Service Delivery” has not been submitted previously for any degree at this or another university. Therefore, I declare this work as original in design and execution, and all reference material contained therein has been duly acknowledged.

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ABSTRACT

The emergence of new ICTs is triggering organisations into digital transformation, targeting their business model, resulting in a shift on how organisations operate and generate revenue. Moreover, high consumer technological demand and external dynamics also signify the need for organisations, both public and private, to reshape their operations on how they respond to emerging technologies. The study investigated the digital transformation initiative to integrate emerging technologies into the South African rural municipalities business model. A pragmatic paradigm was adopted to achieve the study objectives, and holistically examining the digital transformation in municipalities, and further allowed the researcher to explore digital transformation initiatives from both individual (citizens) and organisation’s (municipalities) perspectives. Self-administered questionnaires were distributed to collect quantitative data from citizens on their perception towards emerging technologies as a model of accessing and engaging rural municipalities. Interviews were conducted with rural municipalities departmental managers. IBM Statistical Package for the Social Sciences (SPSS) was used for regressions and correlation test analysis, while the IBM AMOS was deployed to test the study model and confirm the study’s quantitative results. Furthermore, Atlas. ti was used to analyse qualitative data. The results of the study show that both citizens and rural municipalities have a positive perception towards using emerging technologies in municipalities. However, the citizens identified safety issues as their primary concern. Furthermore, the study shows that rural municipalities currently do not have the right skills, expertise, resources, infrastructure, external relationships, research, and innovation capabilities to support digital projects initiative. Based on the findings, a framework to support digital transformation initiative in rural municipalities was developed.

Keywords: Municipalities, Citizens, Digital transformation (DT), Emerging Technologies, Business model, Business model innovation, Service delivery, adoption, use.

1 CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

The emergence and integration of mainframe computers into businesses in 1951 was dubbed an incredible innovation in various economic sectors as it brought new ways of operations (Sørensen, 2016). This was the birth of information systems, which have become a core part of business operations in different industries. It has turned out to be a driving force behind the success of many businesses because of its ability to transform business processes and innovation within the organisation. It is also why organisations are reshaping their business models into digital-oriented models. Around the world today, organisations are adopting more advanced ICT infrastructures for their daily operations, especially web-based applications such as e-commerce and cloud computing (Janssen et al., 2008). These adoption processes aim to improve production and service delivery and, more importantly, create customer value. In the private sector, the success in adopting advanced emerging technologies has increased the value of innovation within organisations (Vorbach et al., 2017).

In the public sector, emerging technologies have been changing how services are delivered; hence, across all levels of governing in different countries, governments have been shaping themselves to cope with emerging technologies such as self-serving kiosks, chatbots, and wireless sensors, mobile payment systems, social media platforms and drones. (Gil-Garcia et al., 2014). However, transforming the organisation into a smart organisation, which involves digital transformation, reshaping business models, and implementing new business ideas into the organisation through ICT, can be challenging. Gil-Garcia, Helbig, and Ojo (2014) argue that the government sector requires capabilities to rethink the best ways to integrate information, technologies, and innovation into government activities. Furthermore, in their study, Shamsi et al., 2018, suggested that transforming into an intelligent Government requires a great shift among all stakeholders. That suggests that the digital transformation process needs to be looked at from both sides: the demand and supply sides. In their study, Giri and Shrestha (2018) concluded that it is not possible to implement the e-government concept only from the government side; it needs people's support and trust.

The emergence of ICT innovation means that tasks that were known to be completed by a human can now be processed by programmed machines, which are more efficient and effective as compared to human beings. These technologies also create new opportunities and challenges for organisations (both the public and private sectors). The efficiency and effectiveness of this innovation mean organisations are improving customer satisfaction by

meeting their needs. However, in the public sector, the aim of adopting advanced technologies is to improve the quality-of-service delivery to the people. The best return on investment in ICT begins with adjusting the organisation's business model to align with technological advances, combining information, computing, communication, and connectivity (Remane et al., 2016).

Digital transformation has been moving slowly in most parts of the world, particularly in developing countries (Chakravorti, Chaturvedi, 2017). Organisations rely on their adopted business models for value proposition, value creation, and value capture (Osterwalder & Pigneur, 2010). However, some organisations still need to deliver on their mandate. The South African public sector is one example of organisations that still fail to deliver services to the public as expected, judging by the violent protests recorded against the Government (Matebesi & Botes, 2017). In most cases, citizens are suffering because the public sector in South Africa is failing to adopt new technological trends.

1.2 Introduction

The digital transformation process is a global phenomenon that has the potential to change how organisations operate and generate revenue. This process has been labelled as an external factor driving organisations to reinvent their business model to improve their operation (Gatautis et al., 2019). Organisations are adopting digital technologies to grow their market share and customer satisfaction (Wirtz et al., 2018). However, in some sectors, the cost of ICT investments is higher than the return. Even though organisations continue investing in digital transformation, the benefits of these technologies in enhancing customer value are yet to be realised (Piccinini et al., 2015). This is especially true in the public sector, where decision-making processes seem detached from ICTs. Toots (2019) suggests that governments' vision is to integrate public services and ICT. However, this has been proving difficult to live up to, resulting in a lack of ICT capabilities and an understanding of citizens' needs. Bounabat (2017) pointed out that today, citizens have become digital participants driven by the high distribution of smartphones, social networking, blogging, and other online applications. Organisations need to utilise technologies on two fronts (Seppanen & Makinen, 2005):

- Using internal technologies improves operation and production and offers sound solutions by developing abilities to analyse, predict, and make decisions.
- Thus, better citizen service delivery.

This makes the process of integrating public services and ICT more significant. However, Schiavone, Paolonec, and Mancinia (2019) suggest that transitioning to a digitalised solution requires effort, as it involves re-formulating organisational strategies, additions in technologies, and the management of people (employees) and their perceptions. Von den

Eichen, Freiling, and Matzler (2015) argued that most organisations are failing to implement new business models, and when analysing this failure, barriers such as awareness, cultural constraints are some causes of failure.

The four barriers mentioned by Von den Eichen, Freiling, and Matzler (2015) are critical to an organisation's ability to innovate. An organization's correctly implemented ICT infrastructure guarantees a good return on investment. It should involve plans to deal with challenges such as lack of awareness and organisational cultural constraints. The South African Government is pushing very hard to improve service delivery to the people by digitalising their business processes. However, (Nambisan et al., 2019) outlined that the digital transformation processes entail more than just the Information Technology (IT) department but involve everyone attached to that organisation. This justifies the notion that changing traditional business processes to digital business models is a desired strategy within organisations. They suggested that the South African Government should also expect and solve internal and external challenges for digitalising processes to succeed.

1.3 Problem Statement

Emerging technologies are resulting in organisations considering revisiting their business models to align them with these technologies (Wirtz et al., 2019). According to Gatautis (2019), ICTs are an enabler for business innovations such as digitalisation, and intelligence governance in government. Li (2017) alluded to ICTs as the driving force behind the development of business models, which determine how organisations operate and generate revenue. Hence, there is a link between ICT, digitalisation, and business model. Organisations are integrating digital solutions to increase customer interaction and enhance communication, service delivery, and trade (Linkov et al., 2018). Driven by perceived opportunities attached to ICTs, organisations that capitalise on digital transformation outperform their competitors (Parida et al., 2019).

In the world, private sectors are now adopting emerging technologies such as chatbots and artificial intelligence in their operations (Chen et al., 2024). According to Gil-Garcia, Helbig, and Ojo (2014), integrating ICTs and government activities has been in existed since the 1960s. One of the central values of integrating ICTs into government is providing more public services to citizens in more efficient and cost-effective ways. Copping the private sector model and processes will lead to a service delivery framework that is practical and efficient, improves services, better accessibility of government services, and more transparency and accountability (Shamsi et al., 2018). Advanced technologies such as wireless sensors, artificial intelligence, 4IR, predictive analysis, internet of things (IoT) and mobile platforms can be the version of e-government to intelligent government. Wirtz, Weyerer, and Schichtel

(2018) regard smart government as "the highest modernization phase of the public organizations" that is characterised by elements of reflection, information-gathering and processing, and reliance on ICT and relies on principles of openness, participation, and improvement of public sector services.

ICTs are found to be making a major impact on the relationship between the government and the people (AL Shamsi et al., 2018; Mawela et al., 2017). On an annual basis, the South African National Government distributes funds to the local government to improve their operations, promote public participation and interaction, and enhance basic service delivery (Shirahada et al., 2019). Most of the municipalities in South Africa are characterised by mismanagement, corruption, lack of transparency, and poor service delivery, of which emerging digital technologies like mobile payment systems, chatbots, and blockchain could be a reasonable solution (Aliyu et al., 2020; Warkentin & Orgeron, 2020). Since 1994, the human-based operations model has been the main channel of intersection between municipalities and their stakeholders in South Africa. This has proved less efficient and effective, judging by the number of service delivery protests directed at local municipalities. Public service delivery tasks need to be redesigned by adopting emerging technologies to solve challenges faced by the Government (Shamsi et al., 2018). Changes in the environment have made innovation unignorable. In the USA, it has been found that there is high citizen demand for digital services from the government, with 92% indicating that it will positively impact their perception of the government, which is at an all-time low (Mehr et al., 2017). Furthermore, the negative perceptions of government are driven by lack of modernity, political distrust, and aging population-workforce.

In most of the public sectors, the use of ICT has been lagging as more efforts are channelled on the internal side rather than holistically; this is so while citizens demand ICTs and distribution of smartphones are continuously increasing (Al-Obthani & Ameen, 2018). Smartphones drive emerging technologies such as mobile payments and social media networks and intelligence chatbots. They can generate huge amounts of data (big data), which the governments can utilise to better understand their citizens, enhance decision-making, and improve quality of service delivery. The 4IR, in the form of artificial intelligence and predictive analysis can change government citizens' interactions and abilities to understand and predict the needs of both communities and citizens individually. Advanced technologies such as the Internet of Things (IoT) can collect data from objects and can be helpful in managing service delivery resources and infrastructure without human intervention, thus enhancing service delivery (Kankanhalli et al., 2019).

Wirtz, Weyerer, and Schichtel (2019) describe IoT as an open and comprehensive network of intelligent objects that can auto-organise, share information, data, and resources, reacting and acting in the face of situations and environmental changes. We have seen the benefits of technological innovation in the private sectors, such as in manufacturing, using wireless sensors to control and manage temperature when manufacturing, and in retailing, using predictive analysis tools to identify potential customers, banking for 24/7 hours of interaction through chatbots. Technologies have become part of our lives, and for the public sector, such as municipalities, to capture the potential benefits of emerging technologies, they need to redesign their business model to smart ones (Chari, 2019). However, for municipalities to respond to emerging technologies there is a need to understand citizens' needs and behaviour, understand the key area to transform and key enablers of transformation.

The research problem for this study reads:

- *Gearing for emerging technologies such as the 4.0 industrial revolution, public sector organisations need to reinvent their business model framework to integrate emerging technologies such as IoT, Artificial Intelligence, and predictive analysis into government activities. This will improve government-to-citizen interactions, decision-making, and service delivery.*
- *Driven by the adoption of new technologies, most citizens have basic skills in using mobile applications (mobile apps) and other virtual applications that present life experiences. Local governments in rural areas need to readjust their models to meet the technological demands of the citizens to improve their business operations, interact with stakeholders, and enhance transparency rather than stay stuck on the traditional brick-and-mortar business model. Similarly, back-end computerisation alone is not adequate without embracing the emerging digital technologies for citizens' use. This alignment and recalibration call for further investigation, which constitutes the core of this study.*

1.4 Research Aim, Objectives, and Questions of the Study

The following are the Aims, Objectives, and Questions:

1.4.1 Research Aim of the Study

This study investigates “digital innovative solutions in redefining South African local government services delivery model” to propose a digital transformation framework for rural municipalities in South Africa in response to environmental uncertainty.

1.4.2 Research Objectives of the study

The objectives of this study are:

- To understand citizens' and rural municipalities' perception of local government integrating emerging technologies such as Artificial Intelligence systems to enhance service delivery.
- To identify challenges South African rural municipalities face in response to emerging technologies.
- To classify the digital capabilities, local government needs to develop in response to the dynamic scope of operation to enhance the service delivery system and to promote virtual interactions.
- To develop a digital transformation framework for the South African rural local government to successfully integrate emerging technologies into their business model.

1.5 Research Questions: The research questions of this study are:

- How do rural communities and rural municipalities perceive the integration of emerging technologies into local government activities?
- What are the challenges faced by South African rural municipalities responding to emerging technologies?
- What are the digital transformation capabilities that the local government needs to develop?
- How can local government technologically innovate their business model to enhance service delivery?

1.6 Justification of the Study

The channels of local governments' interaction with communities go a long way toward citizens' satisfaction with public service delivery (Wang et al., 2021). Hence, to a larger extent, the local government is responsible for transforming the service delivery system through integrating advanced technologies such as smart metering, AI, IoT, cloud computing, and predictive analysis tools. Advanced technologies promote seamless interactions between customers and enhance the decision-making process within organizations. Thus, improving service delivery to the communities. However, with all the benefits of advanced ICTs and high citizen ICT demand, South African public institutions are lagging in integrating their activities with advanced technologies in their business models. The emergence of ICTs is pushing organisations to revisit their business models to redefine them to align them in response to

dynamic changes in their ecosystems. This study will assist the public sector in paving the way for the smooth transition into digitalised smart solutions by proposing a digital business framework that supports the South African status in ICTs and promotes self-serving, transparent, virtual interaction, and quality decisions on service delivery. Due to the high distribution of mobile phones, internet connectivity, and the emergence of the 4.0 industrial revolution, this study will assist the South African Government in identifying pertinent factors that should be considered to capitalise on the advancement of the public sector through the latest and viable technologies. This study intends to add new insights into the existing literature on innovative ways to transform local governments into smart ones. The competent level of local government in delivering quality services has been an issue since their introduction, especially in areas formally known as Homelands. Dynamic Capabilities and Business Models have been adopted in the private sector as a foundation of innovation. However, little is known about their contributions to the public sector in line with innovation. With less research focused on innovating the public sector through understanding top managers' capabilities in innovating and innovation, incorporating the Dynamic Capability Model, Business Model, and citizen's response to innovation will contribute more knowledge in the local government development, innovation, and service delivery.

1.7 Delimitations of the Study

The study looked on digital transformation initiative holistically, thus the study looked at both citizens and government perspective. Digital transformation is not immune to any industry, including both private and public sector. However, this study focuses on the digital transformation initiatives in rural local municipalities of South Africa, thus even though the researcher acknowledges the challenges faced by other municipalities in more urban areas of South Africa. The study is solely focused on the rural municipalities, although the researcher acknowledges the existence of relationship between three spheres of democratic government of South Africa, the study does not focus on the relationship between local government/ municipalities, provincial government and national government towards digital transformation.

1.8 Operational Definitions

- This study selected three definitions by Amit and Zott, Osterwalder, Pigneur, and Espoito (2011). Amit and Zott (2010) perceive the business model as a combination of the transaction content, structure, and governance in a manner that creates value through the exploitation of business opportunities. This is creating value through interlinking profit formulas, strategies, and management and assisting businesses in

responding to environmental changes. Osterwalder and Pigneur (2010) define the business model as a combination of value offering, value creation, value delivery, and capture. In the context of this study, the business model is defined as the setup that the local government has adopted to enable the delivery of service to the people.

- **Fourth Industrial Revolution (4IR)**: according to Philbeck & Davis, 2018, 4IR concept affirms that technological change is a driver of transformation relevant to all industries and parts of society. In this study, fourth industrial revolution is defined as emerging technological innovations that bring changes to the society and how governments are delivering value to the communities.
- **Digital Business Transformation** is the application of technology for building new business models, processes, software, and systems that result in more profitable revenue, greater competitive advantage, and greater efficiency (Okano et al., 2019). In the context of this study, digital transformation is defined as the process of adopting advanced ICTs that promote virtual interaction between government and citizens and enhance service delivery.
- In addition, Spieth, Schneckenberg, and Ricart (2014), indicated that **business model innovation** is discovering fundamental business models within the existing business model. Chesbrough (2010) perceives business model innovation as the commercialisation of ideas and technologies through their business model. In this study, business model innovation is the activity that involves thinking from the current way of doing things (operating) into new ways of doing things. In local government, this involves moving away from on-counter services and office-to-office operating methods to virtual interaction between government and citizens.
- **Disruptive technologies** displace established ones to shake up existing industries or even create entirely new ones (Onyeji-Nwogu et al., 2020). The study titled Disruptive Technology Reconsidered: A Critique and Research Agenda by Danneels (2004) concluded that the term disruptive technology was still loose. However, the researcher perceived disruptive technology as changing the basis of competition by changing the performance metrics along which firms compete. In this study, disruptive technologies mean new technologies coming into place and having the power to change how public institutions operate, for example, mobile payment systems.
- **Information Communication Technology (ICT)** refers to technologies that provide access to information through telecommunication. It is like Information Technology (IT) but focuses primarily on communication technologies (Ratheeswari, 2018). In this study, ICTs refers to the computerised devices that promote interaction and sharing of data and information between government and citizens.

- **Local governments** are regarded as the custodians of public funds, and consequently, they have been tasked with utilising these resources to address the basic needs of local communities, notably infrastructure, electricity, water, refuse removal, and the spatial development of localities (Reddy, 2016). Phago and Molosi-France (2018) referred to local government as a sub-national political institution designed to cater to local communities. In the context of this study, local government is the government entity situated at the end of the hierarchical level of the South African Government with the responsibility of providing basic services to the people.
- **Rural local municipality-** in the South African context, rural municipalities fall under category B3 and B4, where category B3 municipalities are mainly characterised by relatively small population, large proportion in urban and based in one or more small towns, and further characterised by agricultural farmers, as economies in these areas are largely agriculturally based. On the other hand, category B4 characterised by the presence of one or two small towns in the areas, communal land tenure and villages or scattered groups of dwellings, and they are mostly located in former homelands (Makale, 2015). In the context of this study rural municipalities are those who are located mostly in former homelands such as Venda.

1.9 Structure of the Thesis/Dissertation

The study consists of six (7) chapters: Chapter one gives an overview of what the study intends to achieve, the purpose of the study, aims, and the study objectives. In the chapter that follows (chapter 2), the researcher discusses the concept of digital transformation, innovations, and business models. Chapter three (3) summarises the reviewed theoretical models on the individual and organisational sides. The research methodology is presented in chapter four (4), including the research design, paradigm, sampling, data collection, and data analysis procedures. Chapter (5) presents the study's quantitative analysis, mainly focusing on citizens' perceptions of adopting emerging technologies in municipalities. Chapter six (6) of the study gives a detailed analysis of the qualitative study, focusing on the organization's perspective on challenges and perception towards digital transformation. The last chapter, 7, presents the discussion of findings, recommendations, and conclusion.

1.10 Chapter Summary

The chapter gave a clear background on the emergence of innovative technologies and how these technologies are influencing changes towards organisations' business models. The study problem statement, aim and research questions were all addressed in this chapter.

Furthermore, the chapter outlines the study research questions, delimitation and significance of the study. Lastly, the chapter outlined the structure of the study.

2 CHAPTER TWO: STUDY LITERATURE REVIEW.

2.1 Introduction

This chapter delves into the concept of local municipalities, business models and digital transformation. The chapter gives a clear definition of local government and outlines the roles and responsibilities of municipalities and their business models. Furthermore, the chapter discusses environmental uncertainty, disruptive innovations in an organisation's business model, and the general description of digital transformation. Lastly, the chapter gives an overview of digital transformation and its role in the organisation's business model, the organisation's capabilities required to respond to the emergence of technologies, and challenges organisations face in adopting digital transformation.

2.2 Local Government

Local government is referred to as a sub-national political institution designed to cater to local communities (Phago & Molosi-France, 2018). In the democratic government system, local government is recognised as vital because it engages citizens and the government in government activities (Kim et al., 2020). Agu and Okeke (2015) and Reddy (2016) gave a clear picture of local municipalities' source of revenue. Agu and Okeke (2019), Kumar and Reddy (2019), and Gumede, Byamukama, and Dakora (2019) emphasise that grants from the national government and local activities are the source of local municipalities' revenue.

According to Botchwey (2017), locally elected representatives control local governments with the mandate to deliver basic service to the citizens. For example, in South Africa and Nigeria, local government is one of the spheres of democratic governmental systems (Agu & Okeke, 2015). In South Africa, local government, the lowest of three spheres in the democratic setup, is regulated and controlled by two other higher spheres, as indicated by van Wyk (2012). Therefore, national, and provincial levels can have roles to play in municipalities setup, generating policies to develop, control, and manage.

2.2.1 Local Government in South Africa.

The Constitution of the Republic of South Africa (1996) considers the local government as having the authority to govern and manage its initiatives. However, they are directly linked to both provincial and national governments (Hanabe et al., 2018). In South Africa, there are three categories of municipality (A, B, and C), and there are 278 municipalities comprised of eight (8) metropolitans which falls under category A; 226 local municipalities which falls under

category B; and 44 district municipalities which falls under category C. They are all focused on growing local economies and providing infrastructure and services, as the South African Yearbook (2018/19) indicates.

2.2.2 Roles and Responsibilities of Local Government.

According to Hanabe, Taylor, and Raga (2018) and Kraai et al., (2017), local government is the sphere operating closest to the citizens, and its primary aim is to satisfy citizens and communities by rendering basic services as assigned by the constitution of the country. Every government worldwide is accountable to various stakeholders, mainly the citizens and business community, whose focus is to provide seamless service to them (Kaur & Kaur, 2017).

In addition, Masuku and Malope (2019) indicate that local government, by default, is expected to offer direct interaction with the communities and deliver essential services, and to achieve this, Botchwey (2017) suggests that decentralisation was created to bring decision-making closer to the people and to transform government into an entity that addresses the needs of the citizens. This was done to ensure that people's voices are heard as they are major stakeholders in the democratic government.

To deliver on their mandate, Hanabe, Taylor, and Raga (2018) further suggest that local governments need to work with the communities to meet their social, economic, and material needs, which contribute to the development of their human lives. Phago and Molosi-France (2018) indicate that the function of local government is to render the daily basic public needs and to interact with communities.

According to Haigh, Fox, and Davies-Coleman (2010), in South Africa, communities are important as they form a core of local municipalities' formulation through The Development Facilitation Act (Act No. 67 of 1995). In South Africa, communities have a significant role in policy change and development in local municipalities through the Integrated Development Plan (IDP).

According to van Wyk (2012), the IDP should include the development framework, the main objective of which is to address the modernisation of the municipality and relate to the nature and location of development in the municipality. This suggests that local municipalities should have a clear plan to innovate and change how they operate to enhance service delivery to the communities.

Furthermore, the IDP plays a central role in integrating people and local municipalities and promoting community participation and development. Local governments should deliver public service to the citizens, as suggested by De Visser (2010), who painted local municipalities as

a point of delivery for services such as housing. Moreover, De Visser (2010) indicates that local municipalities, according to the Constitution of the Republic of South Africa (1996), must contribute to the realisation of the right to housing within their constitutional mandate by making land available, by ensuring the provision of services such as water, sanitation, electricity, roads, stormwater drainage, and transport, and by ensuring access to housing for its citizens. This supports the statement by Haigh, Fox, and Davies-Coleman (2010) who highlight that the main responsibilities of local municipalities are to deliver water to the communities as stated by the Constitution of the Republic of South Africa Act 107 of 1996 and Water Service Act 108 of 1997.

2.2.3 Local government service delivery model

In a country such as Nigeria, poor service delivery is attributed to poor planning, with good planning undermined by poor implementation (Omar, 2009). Knox and Janenova (2018) argues that citizens judge the ruling government based on the services they deliver, such as housing, education, and other related responsibilities. South Africa has been voted the second most unequal nation in the world, with more than half of the population living in poverty and rural communities (Masiya et al., 2019). Thus, most the of South African municipalities serve in rural areas.

The past decade has seen major initiatives worldwide to reform and modernise local government. Although there are specific national patterns of local government reforms, there has been a strong international trend towards improving local service delivery — both in terms of the performance standards set and the mechanisms for planning and implementing service improvements (Bovaird & Loffler, 2002). Hence, the help of continuous evolution has resulted in the introduction of e-governance, which (Dash, 2004) refers to the use of information and communication technologies (ICT), such as the Internet, wide area networks, mobile phones, etc., to deliver services to citizens.

Globally, both public and private sectors have made some strides in adopting new ways of operating and delivering services to their people. According to Mattsson and Andersson (2018), there is an ongoing digital transformation in both private and government institutions. However, the study by Cho et al. (2020) shows that the number of local governments adopting new digital platforms is limited. However, Perez-Morote, Pontones-Rosa, and Nunez-Chicharro (2020) indicate that although digital transformation is moving at a slower rate in local governments across the globe, different countries are in different stages of transiting and using e-government.

However, the consensus is that more countries are still lagging in aligning their operations with the external environment controlled by open innovation. This is supported by Kamau, Boore, Maina, and Njenga (2018) who argue that most developing countries are not yet making a mark in the utilisation of ICTs in their activities. According to Hasan (2014), in developing countries, there is a huge gap between initiative and reality in adopting e-government. Knox and Janenova (2018, indicated that e-government fails because of design reality gaps, major goals for the initiative were not attained, and/or there were significant undesirable outcomes.

The lack of internet connectivity in many areas, especially at workplaces, inadequate ICT equipment, lack of ICT knowledge, unreliable power supply, and cost of accessing and using ICT services were found to be the major challenges Tanzania's Local Government was facing in the adoption and use of ICT's (Manda & Mkhai, 2016). This is also the case in some parts of India as it is found that ICT facilities are not effectively used and mostly result in failure, and this is the situation in most developing countries (Sabastian & Supriya, 2013).

Hence, public institutions in developing countries are encouraged to use technological innovation to enhance their services (Chigona et al., 2014). Giri and Shrestha (2018) found that countries such as Nepal have not yet received the reward of e-services because of poor infrastructure, connectivity, ICT awareness, and literacy rate. In their study, Khalid, and Lavilles (2019) argue that the socio-culture, the complex nature of the country, and the lack of resources were identified as factors impeding the transition and adoption of e-government.

In line with technological changes and innovation, Lee, Oh, and Nam (2016) indicate that there is a high increase in ICT demand and ICT-based services. Maseh (2016) argues that governments are increasingly adopting e-government in the public sector. Manda and Mkhai suggest that this technological development and its application are aimed at enhancing effectiveness and efficiency within the organisation with the assistance of the Internet. However, it is important to understand internal and external constraints in innovating local government into e-government (Li & Feeney, 2014). According to Cho (2020); Sebastian and Supriya (2013), inequality in internet access, skills, income, and education level can be a challenge when the government shifts to digital online solutions. The world we live in today is comprised of (VUCA) volatility, uncertainty, complexity, and ambiguity (Schoemaker et al., 2018), and as a result, organisations need to find a way to respond to environmental turbulence to remain competitive and creating value to customers.

2.2.4 South African local government service delivery model

Local government internationally is considered the sphere of government closer to the people. In South Africa, their basic task is to render basic public needs and services that would improve the quality of life and enhance people's livelihoods. However, political interference and administrative failure are central to poor service delivery. According to Msenge and Nzewi (2021), there will be a growing number of service delivery protests because of a lack of information and interaction between communities and local government administrators. According to Koma (2010), external and internal services are in the portfolio of local governments in South Africa. External services are those rendered to the public, and internal services assist local government in rendering external services. This translates to the primary elements of a business model as it includes value proposition represented by external services listed by Koma (2010) such as the delivery of water and electricity, town and city planning, road and stormwater, waste management (refuse collection), emergency services, for example, firefighting, licenses, fresh produce market, parks and recreation, security, libraries, town and city planning, and economic planning. The internal services represent key resources in place to assist local governments in delivering on their mandate, including human resources and information technologies.

Tshiyoyo and Koma (2011) identified some of the challenges behind poor service delivery in South African local government: huge service delivery and backlog challenges; poor communication and accountability relationships with communities; problems with the political/administrative interface; corruption and fraud; poor financial management; number of violent service delivery protests; weak civil society formations and insufficient municipal capacity due to lack of scarce skills. In most cases these result from the complementary business model; politicians are found to be abusing power more, especially in recruitment, and recruitment is not done on merit. This means that local municipalities' influential power lies in politicians and administration (Masuku & Jili, 2019).

According to Tshiyoyo and Koma (2011), local municipalities in South Africa the local government operates in accordance with following requirements of the Municipal Systems Act (32 of 2000), which also promotes innovative management and administration systems geared towards improving service delivery provision. Local municipalities achieve service delivery through implementing the Integrated Development Plan (IDP), which sets out the vision, needs, goals, and strategies of local government, and most importantly, communities have a say in the content and drafting of the IDP. In addition to politicians and administrators, as

mentioned by Masuku and Jili (2019), communities are also key role players in the South African local government service delivery model.

Koma (2010) state that in local government, there is a need to reform, transform, and change in response to change, planned or unplanned, in response to pressure or forces; this would enable better adaptivity to new technologies, markets, and challenges in local government to improve services delivery provision. Helfat and Karim (2014) signalled the importance of management in response to environmental changes. These changes are part of the dynamism in the environment which scholars Froehlich et al., 2017; Teece, 2018; Ambrosini and Altintas, 2019; Osisoma et al., 2016; and Teece, 2007 already indicated when they argued that organisations need to reply to them through dynamic capabilities. However, Ambrosini et al. (2019) indicate that for an organisation to respond to environmental changes, the organisational managers perception of changes in the external environment is of paramount importance, and the manager's awareness of the organisation's need for change.

2.2.5 Local municipality ecosystems

The ambiguity, complexity, and inherent dynamics in service innovation and digitalisation are likely to put pressure on organisations to reshape their business model (Mattsson & Andersson, 2018), thus changing how organisations operate. Therefore, the top management in public or private organisations needs to be watchful and pay full attention to technological disruptions as indicated by Battisti (2020). Hence, Volberda, Van Den Bosch, and Heij (2013) introduced the concept of management innovation which relates to the introduction of new management practices, processes, or structures to further organisational goals, significant for organisation responses. Managers in organisations are vital for organisational responses to environmental changes such as customer expectations, superior pressure, and technological disruptions. In support of this, Hänninen, Smedlund, and Mitronen (2017) further emphasised the vitality of managers in understanding digitalisation processes and how to respond to problems and opportunities presented by the world we live in today.

The success of the business is determined by its business model, which defines how the organisation operates. However, in a world confronted by VUCA conditions with destabilising effects, an organisation needs to modify its business models (Hwang & Christensen, 2008), and that can be done through digital transformation processes. Business models are significant in selecting technology and organisation assets (Teece, 2018). This means that when an organisation digitally transforms its business model, it should align with its core business processes. The evolution in ICT has rendered more organisations' business models obsolete (Liu et al., 2011), which triggers organisations to renovate their business models

(Shiels et al.,2003). Furthermore, Sebastian and Supriya (2013) indicate that in the public sector, the aging workforce is also putting pressure on organisations to modernise their way of doing things through innovative applications of technology.

ICT is everywhere, and for organisations to take advantage of these innovations, they need to rethink and develop new ideas to redefine their business model. Furthermore, Berman, (2012) argue that the key areas that the organisation needs to focus on are reconfiguring customer value proportion and reshaping how the organisation operates, defining how customer value is delivered, and developing new digital capabilities. For the organisation to be flexible and responsive to environmental changes, such as changes in customer expectations, there is a need to develop a new portfolio of capabilities that are essential to digital transformation processes.

2.3 Industrial Disruption.

Industries are shaking because of technological disruption, and new technologies are changing everything: businesses, government, and the way people live. Hence, various sectors have been affected by ICT (Rokhman, 2011). Emerging technologies such as cloud computing, artificial intelligence, robotics, 3D printing, smart devices, big data, and social media led to entirely new products, services, and business models across industries (Matzler et al., 2018). The convergence of multiple technologies promotes immediate interaction between a wide range of people, regardless of geographic location and time zone (Zaki, 2019), such as the Internet of Things technological innovations with the capability to attach internet services to objects and convert them into smart objects. Organisations that ignore these dynamics and act slowly are struggling and stuck in their existing business models. Disruption may come from companies outside the industry, inside, or from startups.

Most established organisations ignore disruptive technologies as their existing business model does not suit those disruptions. To tackle digital disruptions, the organisation needs to first understand what problems customers faced, develop the right mindset aligned with possible risks and threats that may result from disruption, think in the business model, and open the strategy process (Matzler et al., 2018). Due to disruptions caused by emerging technologies, both government and private sectors are adopting e-business (Kaur & Kaur, 2017). In government, using ICTs benefits both government institutions and stakeholders.

Using social media in South African government can foster democracy by promoting public participation and knowledge in government actions and open engagement opportunities (Graham, 2014). Through the developed integrated information systems, citizens in Korea are increasingly accessing public services online or via their mobile phones, such as payments of

bills and applications for passports and visas; examples are e-Seoul and Minwon 24, initiatives in Korea that allow citizens to use mobile phones to access public services anytime and everywhere and in different languages (O'Donnell & Turner, 2013).

Accessibility is one of the major benefits of e-government, as suggested by Rokhman (2011), who argues that citizens can be able to access services 24 hours whenever and wherever they are located. Digital platforms are now adopted and used for online town meetings, with social media being used for disseminating information (Cho & Melisa, 2021), and that is the result of digital transformation processes applied in different organisations, and inequalities for opportunities are reduced (Sebastian & Supriya, 2013). In their study, Gil-Garcia, Dawes, and Pardo (2017) describe the digital government as a dynamic, open system characterised by six dimensions or themes. This includes the purpose and role of government, recognition of broad societal trends, attention to the nature of changing technologies, human elements of choice and self-determination, information creation and management, and ongoing interaction, change, and complexity.

2.3.1 Information Technology as cause of industrial disruption.

Information Technology is the most prominent component in the world since its invention into the business sector, and today, almost every sector worldwide is undergoing a digital revolution, which is also changing consumer behaviour and how businesses operate (Zaki, 2019). ICTs are changing business processes in different sectors (Ogbomo, 2011) due to their ability to provide accurate, high-speed, transparent, highly efficient, and very effective services. There is clear evidence in the literature that supports that ICT has changed how private organisations operate, and this is putting pressure on the public sector to innovate their operations, such as the introduction of e-Seoul and Minwon 24, mentioned by O'Donnell and Turner (2013). According to Vendrell-Herrero et al. (2018), no sector is immune to digital business model as it has been implemented in different industries; hence, public sectors are moving into adopting technologies that are service delivery focused; thus, innovations such as smart cities and e-government are the result of pressure (Lember et al., 2018).

However, Jin and Cho (2015) allude that ICTs are perceived differently, such as the Internet, which some perceive as abusive, and some see it as a way of life quality improvement. This study aims to add to the discourse by investigating how citizens and municipalities perceive the integration of emerging technologies into rural municipalities' business models.

According to Umair, Björklund, and Petersen (2015), since internet connectivity emerged, most communities have been trying to connect to the global network, and it has reached the remotest regions across the world while playing a significant role in the development of those

regions. Thus, there is now a growth in the use of internet and accessibility, even in developing countries. There is a surge in the adoption of ICT in developing countries, with Iran, one of the countries which is leading the way in the adoption of ICTs in rural communities (Alavion & Taghdisi, 2020). People are now using the Internet for shopping, socialising, entertainment, and household management (Berman, 2012), and even though youth are spearheading the adoption and use of mobile devices and social media platforms, the gap between ages is narrowing.

The absorption of information systems and technologies in both sectors facilitates business planning and encourages the development and execution of production programs while stimulating processes and product control (Cuevas-Vargasa et al., 2016). According to Waller and Weerakkody (2016), digital technology plays a significant role in shaping an organisation's business model and has the potential to improve public sector legitimacy. Cordella and Tempini (2015) indicate that adopting ICTs such as office automation software, database management systems, workflow management systems, automated decision support systems, and, more recently, web services, e-services, and cloud-shared systems, can be a power function for public institutions in response to external environmental changes.

2.4 Digital Innovation

Organisations face changes due to digital transformation, which combines digital technologies and physical components to form new products or services. With the clear relationship between technology, innovations, business models, and organisational performance, organisations are now industries that are derived into digital innovations. The business model determines organisational performance. Sahut, Dana, and Laroche, (2020) describe a business model as a set of specific activities, a system of activities aimed at satisfying the perceived needs of the market. Changes in the ecosystem in which the organisation ecosystems are unignorable. Hence, organisations should develop capabilities to respond to the environment to satisfy their needs. The business system of an organisation is composed of three elements: the content, which defines the activities that need to be performed; the structure, which represents how activities are related and in what order; and governance, which represents who is performing the activities.

In the context of the public sector such as rural municipalities in South Africa, it is difficult to think of a public service content that cannot involve the extensive use of ICT, while disruptive technologies are presenting challenges to the traditional public sector business models (Gil-Garcia et al., 2017). The public sector will need to adopt a dynamic or smart business model, which, according to Janenova and Kim, (2016) poses a vital challenge to traditional models

especially in the private sector. In response to the challenges presented by the dynamic business model, Gil-Garcia, Dawes, and Pardo (2017) point out that governments are now across all levels integrating tools, applications, and emergent technologies to improve the needs of citizens, service users, and public servants, and political leaders. Mobile applications, open data, social media, technical and organisational networks, the Internet of Things, sensors, and data analytics, are now integrated into government content. Even though technologies are continuing to emerge, little is known about the integration of digital innovations into the South African rural local municipalities.

2.4.1 Digital Innovation Trends and Justifications

According to De Vries et al. (2017), organisations are adopting innovation in a quest to respond to citizens' rising expectations, budgetary constraints, and several problems that, because of their complexity, cannot be solved using standard solutions. Innovation is central to improving value creation as Helkkula et al. (2018) assert, making innovation a significant phenomenon across all sectors. According to Rothman (2011), studies have proved that e-government is compatible with people's lifestyles and cultures. Furthermore, Tummers and Bekkers (2018) indicate that digital innovation is a significant activity adopted in response to external changes. This is true as people today spend most of their time on mobile phones, judging by the high number of mobile phone distributions and continuous growth in internet connectivity.

2.4.2 Industrial disruption in private sector

Capitalising on new technologies for business opportunities has been singled out as one major reason organisations may need to reinvent their business model (Johnson et al., 2008). According to Vorbach, Wipfler, and Schimpf (2017), technological innovation significantly impacts how organisations operate. This emergence of new technologies is the reason organisations are reconfiguring their business models. Innovation is generally described as coming up with new products, new methods of production, new markets, and new methods of interacting with customers (Planning, 2014). In addition, Spieth, Schneckenberg, and Ricart (2014) indicate that business model innovation is discovering fundamental business models within the existing business model. This means that digital transformation does not necessarily mean that organisations must always come up with a new business from scratch, as they can just adjust the current existing business model. According to Rahman, Hamid, and Chin (2017), innovation can come in the form of sustenance or disruption, as presented in Figure 2-1.

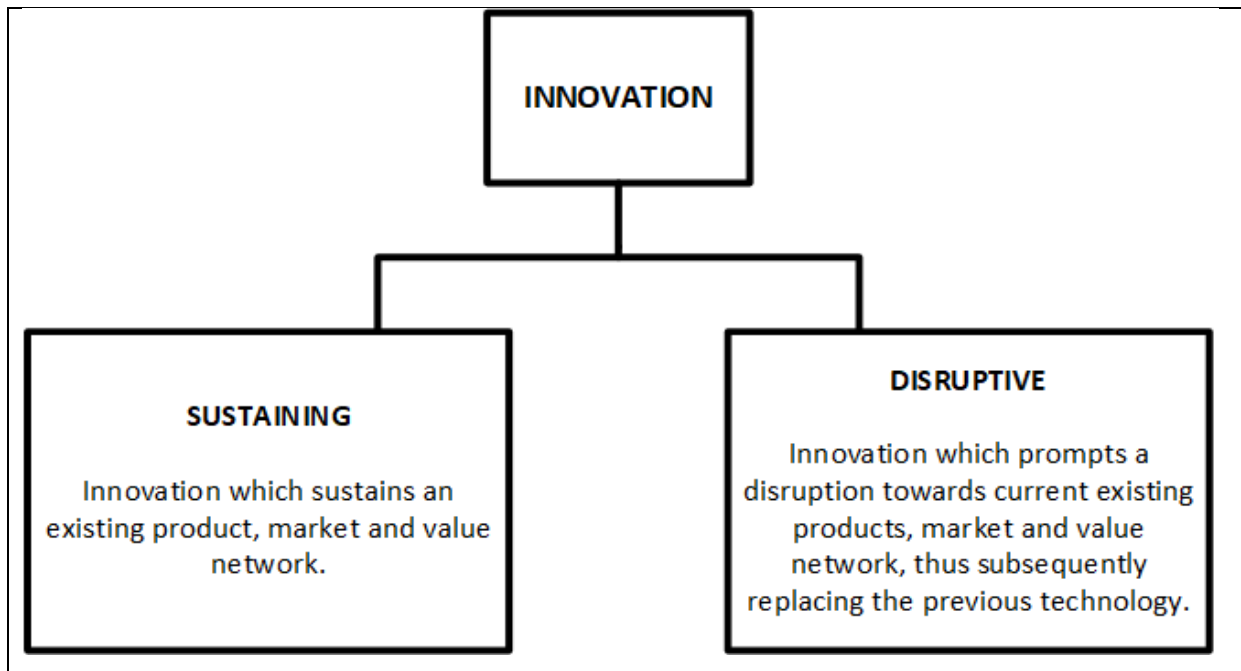


Figure 2- 1: Types of Innovation; Source: Rahman, Hamid, and Chin (2017).

Disruptive technologies are a force behind business model innovation; hence, they change how an organisation's work is designed and how leaders lead their organisations (Schwarz Müller et al., 2018). In addition, Hendrix, and Stoffers (2022); Benlian, Hess, Matt, and Wiesböck (2016) discovered that digital transformation entails profound changes in the company's business model, focusing on processes, resources, operational methods, or culture. Business models from the past decade differed from the current business model because of emerging technologies (Remane et al., 2016). Hence, there is a need to be responsive and readjust the organization's business model to the changing environment. Moreover, Remane et al. (2016) argue that the dominance of the mobility sector and internet connectivity have led large companies to shift their focus to the mobile sector as part of the transformation. Thus, it requires adjusting the current business model or replacing the existing one.

Incorporating an organisation's strategies with these emerging technologies will directly impact the organisation's value chain (Jua et al., 2016). Thus, changing the channels of value delivery and value creation for the customers. For example, this may mean adding new products or changing the value of delivery mechanisms. The high distribution of internet and mobile phones has resulted in banks introducing cardless services such as money transfers and withdrawals. This was a technologically driven innovation in the banking sector. In the case of South Africa, local municipalities, which offer services such as payments of water and electricity bills and other basic services through a traditional business model, innovating their business model would mean moving away from on-counter interaction into computerised

interaction, which is 24/7. In the traditional business model, state-society relationships have been found to remain a problem (Janenova & Kim, 2016).

2.5 Business Model Frameworks.

Furthermore, different business model frameworks have been proposed, and their main difference is rooted in the researcher's observations on the business model concept. However, analysis of business model frameworks showed that most business model frameworks share similarities in themes as Mosleh, Nosratabadi, and Bahrami (2015) argued that almost every author relates the concept with creating and delivering value by business. However, there are a limited number of frameworks on e-government setup, and most exclude external threats such as politics, which plays a significant role in the government setup. Furthermore, there are few business models that focus on technology on both ends: the firm side and the consumers' side. According to Chae and Hedman (2015), the business model should provide a holistic perspective of the business, not only focused on a single end, which will assist in understanding internal functions and structures, as well as its interconnectivity and interaction dynamics with the external world.

The type of business model an organisation needs to adopt is determined by the value proposition element, which defines the product or service the organisation is to offer to its customer segment. The product and service organisations deliver to the consumers determine the business model to be adopted. However, for-profit, and non-profit organisations need the business model as they all generate revenue (Fuller et al., 2017). The above statement justifies the existence of a business model in South African local municipalities. The internet boom of 1990 resulted in the introduction of the e-business model. However, the generic business models are driven by revenue logic and core activities of the organisation (Goyal et al., 2017). This suggests that the organisational setup guides organisational business models. The main objective of local municipalities is to provide basic services to the communities. They depend on the central government for grants and their activities (water, electricity, waste management, and traffic fines) to generate revenue. The attained money is then used to deliver services (construction of roads, houses, and other related services) back to the communities. To provide quality services to South Africa, local municipalities need to adopt a business model that acts as an interlink between them and the community and promotes transparency.

2.5.1 Components of the business model

The components of the business model are often called the building blocks, like the definition. Different authors have different understanding of what the building blocks of a business model

are (Osterwalder & Pigneur, 2002). By default, the components of business models are responsive to environmental change, such as disruptive technologies. Internet connectivity, manufacturing of new hardware and software, processing power, reduction in the cost of IT infrastructure, and the emergence of robotic devices have led to this evolution.

Through digital technologies, organisations can adjust and reconfigure their business model (Wirtz, Langer & Schmidt, 2021). Nowadays, there is a shift in consumer behaviour because of the adoption and use of mobile devices and interactive tools to become instant experts on product and service offerings, hence dynamism in the environment. Digitalisation has changed how individuals interact and these advances in digital technologies are changing citizens, firms, and organisations expectation towards government services, thus provoking the government need to respond through transformation (Wirtz et al, 2021). On the other hand, organisations in the private sector are transforming their business model to take advantage of new possibilities, thus re-innovating the operation model (Berman, 2011). Johnson, Christensen and Kagermann (2008) illustrate the road map into business model innovation including the following components:

- Organisations must think about the opportunity to satisfy the real customers who need a job to be done.
- Construct a blueprint laying out how an organisation will fulfil that need at a profit.
- Compare the proposed organisation's existing business model and see how much is needed to change to seize the opportunity.

However, for an organisation to innovate, create and capture value and build an appropriate business model, it does so through dynamic capabilities which are subsets of capabilities directed toward strategic change at both organizational and individual levels (Helfat et al, 2018). To respond to environmental demands, organisations should develop or possess innovation capabilities which according to Froehlich, Bitencourt, and Bossle (2017) facilitates the incorporation of knowledge and learning related to new products, services, and processes, mostly focused on how processes are conducted, hence, there is a relationship between organisation, routines, and companies' management capabilities. For the organisation to be able to innovate its business process, there should be an understanding from the organisation's managers.

As a part of responding to change, many organisations prioritise reconfiguration of customer value proposition, focusing more on what they offer and how they deliver the products that they offer (Berman et al. 2011), how they deliver what they offer is termed product and service delivery system by Laar, van Deursen, van Dijk, and de Haan (2017). However, in the South African local government perspective where competitive advantage is not their primary goal,

reconfiguration of the product they offer matters a little less than how they deliver what they are offering.

Although Rosacker and Olson (2008) mention the similarities and differences between public sector and private sector. The researcher believes that the main difference in the context of South Africa is on their business models. Hence, their primary focus is to reconfigure the model of product and service distribution. Thus, reconfiguring organisation processes, which was mentioned by Davenport and Westerman (2018). The uncertainty due to ICT evolution requires organisations to adopt computerised product and service delivery systems as part of digital transformation to reshape operating models. In the context of public services which takes citizens' preference into account, there is high pressure from political decision makers and academics to adjust government service structures. South Africa local municipality business model is comprised of external aspects such public demand, underlying strategies as well as environmental components. Johnson, Christensen, and Kagermann (2008) suggest that the business model components are joint elements that work together to create and deliver value to the customer, with the most important being customer value propositions (CVP). Figure 2-2 represents the building blocks of a business model as suggested by: Johnson, Christensen, and Kagermann (2008)

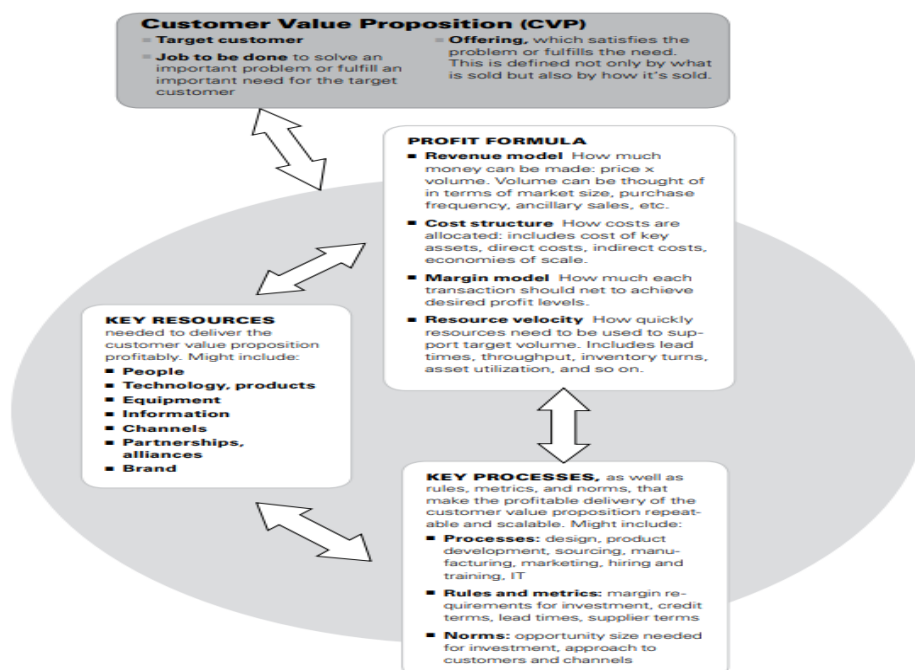


Figure 2- 2: Business model Building Blocks: Source: Johnson, Christensen, and Kagermann (2008)

2.5.2 Adopting Emerging Technologies into organisations' business model.

According to Terán (2018), the term emerging technologies is vague. However, some characteristics define emerging technologies: creating new industries or transforming the existing ones, creating new investment opportunities, and changing the world by offering new benefits and improving people's standard of living. Mandel (2020) also mentions the element of potential to transform society. Emerging technologies have impacted both social, political, and economic scope and triggered industrial and societal changes and transformations.

According to Koelle, Boll, Olsson, Williamson, Profita, Kane, and Mitchell (2018), emerging technologies have allowed humans to solve problems that were previously considered unsolvable; however, these technologies have brought us new intentions, new ways of perceptions towards interactions and usage context. However, Zhao, Zhao, Zhai, Sun, Niyato, and Lam (2021) do not only perceive emerging technologies as the centre of societal change, but also as major influencers in public perception as it is not clear if these technologies will be best or worst thing that has ever happened to humans. On the other hand, Valle-Cruz (2018) perceives emerging technologies as beneficial in multiple ways and present more digital opportunities, especially in the public sector. However, exploiting the opportunities presented by emerging technologies requires organisations to develop new skills, competencies, and education (Bockshecker,2023).

Digital transformation has been researched in different industries and different contexts. The following are some of the scholars who conducted digital transformation studies in different sector: In construction sector by Underwood and Isikdag (2011); public sector, by Adam and Fazekas (2018); financial sector by Johnston and Zhang (2018); in health sector by Vargo, Zhu, Benwell and Yan (2020) Qadri, Nauman, Zikria, Vasilakos and Kim, (2020); in manufacturing by Kerin and Pham (2019); in local municipalities by Bonsón, Torres, Royo and Flores (2012), thus no industry is immune to digital transformation. Successful digital transformation initiatives have got a huge positive impact on enhancing industrial decision making and problem-solving as indicated by Androutsopoulou, Karacapilidis, Loukisa, and Charalabidis, (2019).

Success stories in the private sector on adopting and using emerging technologies, as reported by Androutsopoulou et al. (2019) are triggering the government to adopt intelligence/smart government. According to Gil-Garcia et al. (2014), governments at different levels of governance are now adopting tools and applications to deliver, operate, and grow themselves in a way that they are coping with technological changes (Gil-Garcia et al., 2014). This is also supported by Falco and Kleinhans (2018) who alluded to the rise of digital

platforms to promote service delivery and interaction between government and citizens. However, according to Mergel, Edelmann, and Haug (2019), these transformation activities taking place in the private sector are not only triggering government response to digital change but also raising citizens' technological expectations towards the public sector, adopting and using more advanced technologies. Margel et al. (2019) further indicate that transformation in the private sector has resulted in the establishment of new business models, and as a result, the older existing operating methods are being replaced.

Emerging technologies such as DLT, big data analytics, and AI are some of the technologies promoting smooth interaction between government and citizens and promoting efficient and effective public service delivery. However, governments across the globe are at a different point in transforming their services into smart and automating their service delivery processes, as indicated by Gil-Garcia et al. This can be confirmed as indicated by Adam and Fazekas (2018) who singled out Estonia, who digitally transformed all their public services, and India, which, in the Karnataka District, has invested in e-government software. Emerging technologies have become a strategic element of government in most parts of the world, and they continue to play a significant role in public sector development and government reforms. Furthermore, this technology can save government costs, reduce the workload for public servants, and increase productivity, as indicated by Zhang, Zuo, He, Li, and Yu (2021).

2.5.3 Critique and Limitation: Business model framework.

The concept of business model has long been studied in the context of businesses, and it define what the organisation does and how they do it. Thus, different organisations adopt different business models to satisfy their customers' needs, generate profit and remain competitive. Hence, business model can be a source of competitive advantage over organisation competitors. The focus on the concept of organisation business model has been mainly in the private sector (profit maximising organisations) and less on public institution such as local municipalities who are less affected by competition. Therefore, the current business model framework components lack a political component to address political influence in public sector. Furthermore, the constant changes in dynamic world, requires the organisation to reconfigure their business models to accommodate changes, a step difficult to achieve in local municipalities due to unclear business model.

2.6 Digital transformation

Most of the organisations including public sector organisations will turn into digital preys or digital predators (Fenwick, 2015). According to Fenwick, predators are the companies who will

successfully create value for their customers by embarking into successful digital transformation, and digital preys are those who will fail to adjust their business models to the emerging technologies. No sector is immune to digital transformation (Vendrell-Herrero et al., 2018). According to Sebastian and Supriya (2013), to survive and remain competitive, organisations need to transform their traditional business models to accommodate the dynamic environment. The study conducted by Mergel et al. (2019), through interviewing 40 experts of digital transformation in public sector shows that the main object the public sector aims to transform is their processes, making up 41.5% on different governments which include the US, Spain, and Italy.

Digital transformation improves efficiency because of automotive software and has abilities to refresh the organisation's product, services, and business model (Wang et al., 2019). This supports the findings by Mergel et al (2019), who listed service, product, business model and relationship as some of the key objectives of digital transformation in the public sector. According to Cozzolino et al. (2018), resource dependence upon mainstream customers, rigidity of existing routines and competencies, demand uncertainty, institutional tensions in managing the different organisational demands of disruptive innovations, as well as economic incentives and reliance on established value networks, all these elements are found to be forces impeding the redefining or reshaping of business models after disruptions. In the past decade, government have been found lagging in transforming their activities into more digital solutions. However, with recent developments in ICT, the public sector is now recognising the potential of incorporating organisation's operations and ICT.

Digital transformation has the potential of changing how public and private organisations operate and make profits. With continuous disruptions in the environment, organisations are found to need reformulating their business models to align the emerging technologies or disappear (Parida, Sjödin and Reim et al. 2019). Hänninen, Smedlund and Mitronen (2017) gave example of business model innovation emerging because of advances in ICT and change in consumers' expectations. Remane et al. (2017), outline strategic approach which managers can adopt to discover new business model which suites their organisation. The following are the three steps outlined by Remane et al. (2017):

- Identify existing products and services. Which target market segments should be addressed in the future? Which existing products and services of their and other firms already address them?
- Deconstruct business models. How do these products and services differ along their digital business model components? Which additional business model dimensions and characteristics are possible?

- Discover new configurations. How can existing business models be modified? Which completely new digital business models can be constructed?

Piccinini, Gregory and Kolbe (2015) discovered three major shifts because of digital transformation: Shift in customer behaviour, shift in interaction and shift in producer behaviour. They indicated that with digital transformation, consumers become well informed, which leads to certain digital competence. With local municipalities in South Africa still adopting an off-counter assistance, consumer's digital competence will offer consumers an ability to solve many purchase services issues online, without the assistance of a company's intermediary, through Internet and mobile technologies. Furthermore, the shift in technology promotes interconnectedness where consumers can interact with local municipality 24/7 and with the ability to conduct business outside normal office hours. Lastly, digital transformation enhances firm-consumer digital relationship and establish an understanding between firm and consumer needs.

2.6.1 Digital Transformation in Businesses.

Advances in ICT are bringing new methods of communicating, producing, processing, and delivering services almost every day; hence, organisations continue to invest in and adopt information technology. In addition, digital innovation has transformed the use and behaviour of individuals and organisations. In support of this, Aleshkovski, Bandarenko, and Ilyin (2020), indicate that digital technologies are decisively influencing relations between customers and producers, workers and employers, governmental authorities and society and changing almost everything we do – the way we live, learn, work, relax, think, and make decisions. Sahu, Deng, and Molla (2018) define the term digital transformation in line with the changes that an organization needs to make in its structure, processes, function, and business model to improve performance. Sahu et al. (2018) define digital transformation as both organisational-focused and individual-focused. Organisational and digital transformation link managers, key activities, departments, and business models. The business model element brings customers into the organisation's digital transformation as it is one of the key components of the business model.

With mobile technologies, collaborative technologies, and the Internet of Things (IoT) play a leading role in improving organisational performance (Suhaimi, Mustapha, & Shaik, 2023), organisations are prompted into taking transformation within their organizations. According to Goerzig Bauernhansl, 2018), transformation is changing the paradigm of doing things. Thus, digital transformation is an adoption of digital technologies to change how the organisation does things (value proposition, value delivery, and value capture). According to Piccinini et al.

(2015), the recent developments in ICT are the reason behind changes in many aspects of social and economic life. The same authors further indicate that digital transformation combines information, computing, communications, and connectivity technologies, such as social media, mobile devices, analytics, and cloud computing. In addition, they argue that these technologies are the fundamental core of consumer-firm relationships and play a significant role in our daily routines.

Digital transformation requires rethinking the entire business model. Never have so many innovation opportunities for new products, services, and new business models emerged (Matzletat. al, 2018). However, to reshape an organisation's business model through digital transformation, the organisation needs a series of capabilities. These capabilities should relate to organisation processes, resources, and key performance indicators (Martín-Peña et al.,2018). To develop different business models, firms must bundle all their resources together (Vendrell-Herrero et al., 2018). Furthermore, Martín-Peña et. Al. (2018) argue that for a successful response to environmental changes through a digital business model, organisations should be able to analyse risks and opportunities related to digital transformation, challenges, and success factors in the transition from traditional to digital solutions.

While collaboration is likely to be an important ingredient of a more innovative public sector, a number of the organisational and institutional elements – the culture, the organisational structures, the capabilities, the resource allocation processes, the governance, and supporting management systems (including performance management and measurement), and the authority to innovate – are key determinants of innovative public service and should be the primary focus of public sector innovation analysis. These all properly matter for any organisation's strategic management, providing a framework through which managerial behaviour may be influenced in the interests of public policy. Suppose public service innovation is to play the central role of the umbrella environmental adjustment mechanism for the public service and be manageable in public policy terms. In that case, it must be strategically conceived and actively managed, neither of which applies today.

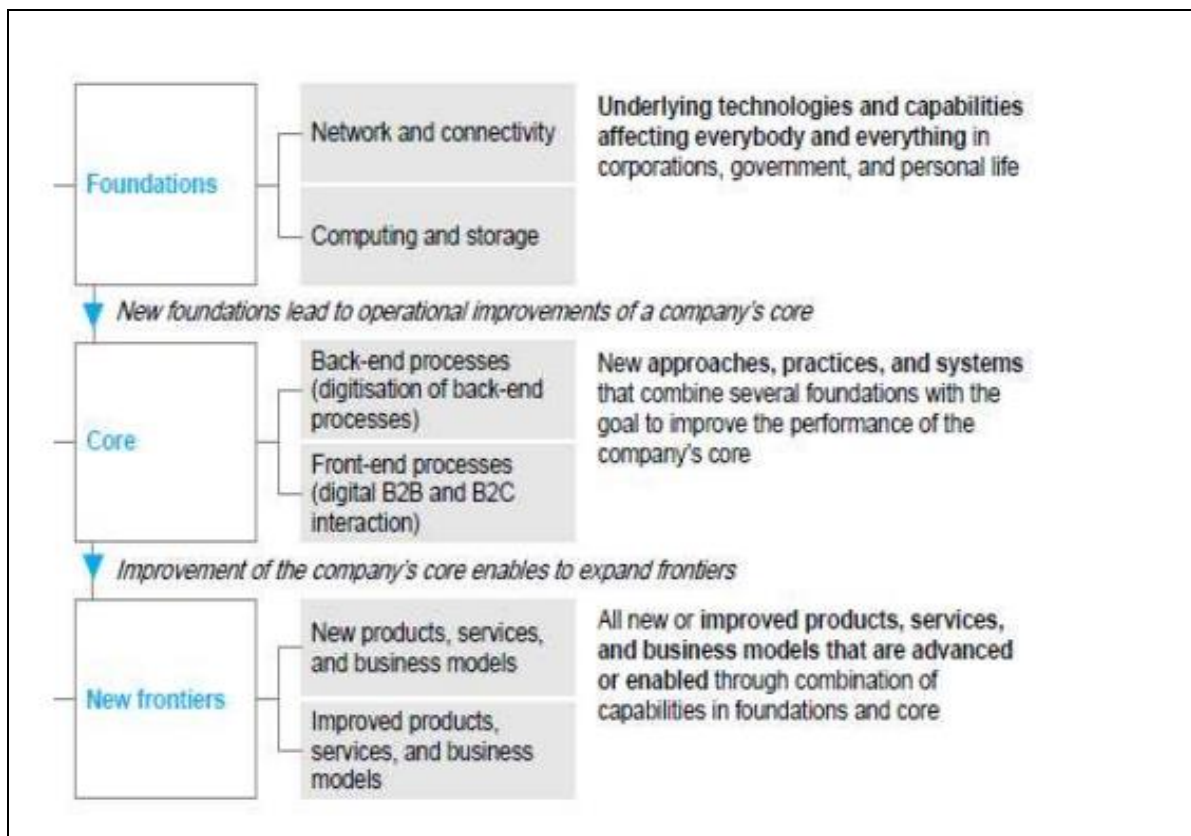


Figure 2-3: Source: *Digital transformation Attributes, Marks, and Al-Ali (2020)*.

The illustration by Marks and Al-Ali (2020) in Figure 2-3, shows the three attributes of digital transformation: foundation, core, and new frontiers. The foundation attribute acts as that of building foundation, although, in digital transformation it is comprised of technologies and capabilities. Thus, technologies and capabilities are the key factors in organisation's digital transformation. However, in developing countries, there is a lack of organisational capabilities, which is very critical for the government as they are the requisites that organisations should develop to enhance value creation in public entity and society (Kempeneer & Heylen, 2023).

Pihir, Pupek, and Furjan (2019) identified the five key determinants of digital transformation, which are strategic orientation, which needs top managers who are supportive and have a clear vision of digital transformation; customers- which involves understanding customer needs and delivering; ICT processes and IT infrastructure, Talent, and capabilities; and lastly innovation culture and organisation commitment. Based on the determinants by Pihir et al., (2019), digital transformation should be look intently at on both customers, organization, and business model perspectives.

2.6.2 Digital transformation in South African Local Government.

According to Galushi & Malatji, 2022, South Africa, like other governments around the world, have been engaging in different digital transformation initiatives to enhance the quality of life and further fast-track service delivery. This can be traced back in 1999, when the South African

government first established SITA (State Information Technology Agency, as a strategic resource for the government to deal with digitalisation and digital transformation. Since then, public institutions and other big municipalities or cities have seen some technological development. City of Ekurhuleni is advancing into smart city with the help of emerging technologies (Ncamphalala & Vyas-Doorgapersad, 2019); “Pocket Maspala” application in City of Johannesburg with the capabilities to enable communities to access municipality services was developed by Mxolisi Kwambakobi (Bvuma & Joseph, 2019). However, most of municipalities digital advancements initiatives in South Africa are taking place in urban areas, therefore those who are in rural municipalities are missing out on the potential benefits such improved communication between municipalities and citizens, and improved quality of services (Shava & Doorgapersad, 2022). Thus, there is a slightly a gap between rural and urban South Africa in public institutions digital transformation.

Digital transformation initiatives in local government and in public sector in South Africa are largely affected by lack of effective and legislative and policy which are outdated, lack of skills and development, and lack of infrastructure (Mosehlana, 2018). This was also echoed by Bvuma & Joseph, 2019, who indicated that challenges such as lack of skills and lack of resources are hindering digital transformation in South African local government. More interestingly Bvuma & Joseph, 2019, argued that there is no universal framework for e government readiness, a component of digital transformation in public sector. The study “Digital Public Administration and Inclusive Governance at the South African Local Government, in Depth Analysis of E-Government and Service Delivery in Musina Local Municipality” by Galushi & Malatji, 2022, found that both municipality staff members and members of the community are not ready to use online platforms due to factors such as lack of skills and resources unavailability.

2.6.3 Transforming organisation business models through digital transformation.

The emergence of advanced technologies, such as the 4th industrial revolution, results in organisational changes in strategies, operations, and values, thus, changing the organisation's business model. Digital business models are the results of digitalisation and servitisation as ICTs have a major impact on how organisations operate and deliver products and services (Martín-Peña et al, 2018). A business model is digital if changes in digital technologies trigger fundamental changes in how business is carried out and revenues are generated.

According to Sahut, Dana, and Laroche (2020), the concept of the Business Model can be traced back to 1960. However, its popularity has increased with the emergence of e-commerce. Goyal, Kapoor, Esposito, and Sergi (2017) depict different scholars' perspectives

on the business model concept. The lack of consensus on the business model concept is clear through scholars' presentations and definitions of the term business model. In addition, Beha and Göritz (2015) argue that scholars do not have a common definition of a business model. Furthermore, Chae and Hedman (2015) indicate that business models differ in their rigour and depth, as well as their complexity, in which definitions, elements, and relations are included and analysed. However, for this study, three definitions by Amit and Zott, Osterwalder and Pigneur, and Esposito (2011) were selected as they are in line with taking advantage of new opportunities, underlining the essentials of interaction between stakeholders, and promoting interlinking between elements of business model.

Amit and Zott (2010) perceive the business model as a combination of the transaction content, structure, and governance in a manner that creates value through the exploitation of business opportunities. This is creating value through interlinking profit formulas, strategies, and management and assisting businesses in responding to environmental changes. Osterwalder and Pigneur (2010) define the business model as a combination of value offering, value creation, value delivery, and capture. Value offering describes the products or services the company offers its customers. The value creation is linked to the firm's architecture, including key resources, activities, and partnerships. Value delivery comprises channels for creating, marketing, and delivering the value and relationship between the organisation and stakeholders. Esposito (2012) perceives a business model as a link between strategy, business processes, and information systems.

The term business model has been widely used by scholars and practitioners in the past decade (Groth & Nielsen, 2015), and according to Perić, Vitezić, and Durkin (2017), the concept is commonly used in management and organisations. The business model concept has surfaced in theory and practice with no clear agreement. However, it has been widely adopted as a useful construct in strategy, organisation, information systems, and technology. Business models describe how firms create and capture value. It illustrates what the business does to whom and how (Mosleh et al., 2015). Every business has its own business model. The business model has two major key dimensions: value creation and value capture; however, Cozzolino et. Al. (2018) indicate that these dimensions are accompanied by subcomponents with the most consensus resources (core competencies, assets, architecture), value propositions, and strategy and structure.

2.6.4 Digital Transformation Capabilities.

The advances in ICT are bringing in new methods of communicating, production, processing, and delivery of services almost every day, hence organisations are continuing investing and adopting Information Technology. In addition, digital innovation has transformed the use and behaviour of individuals and organisations. With mobile technologies, collaborative technologies, and Internet of Thing (IoT) playing a leading role in improving organisation performance (Henriette, Faki and Boughzala, 2016), organisations are prompted to take up taking transformation. According to Goerzig and Bauernhansl (2018), transformation is changing the paradigm of doing things. Thus, digital transformation is an adoption of digital technologies to change how the organisation does things (value proposition, value deliver and value capture). According Piccinini, Gregory and Kolbe (2015), the recent developments in ICT are the reason behind changes in many aspects of social and economic life. They further indicate that digital transformation is a combination of information, computing, communications, and connectivity technologies, such as social media, mobile devices, analytics, and cloud computing. In addition, they argue that these technologies are fundamental core of consumer-firm relationship and play a significant role in the part of customers 'daily lives.

Digital transformation requires rethinking the entire business model. Never have so many innovation opportunities for new products, services and above all for new business models emerged (Matzler at.al, 2018). However, for the success of reshaping the organisation's business model through digital transformation, the organisation needs series of capabilities. These capabilities should relate with organisational processes, resources, and key performances indicators (Martín-Peña at.al, 2018). To develop different business models, firms need to bundle all their resources together (Vendrell-Herrero at.al, 2018). Furthermore, Martín-Peña et.al. (2018), argue that for successful response to environmental changes through digital business model, an organisation should be able to analyse risks and opportunities related digital transformation, challenges, and success factors in the transformation from traditional to digitalised solutions.

Whilst collaboration is likely to be an important ingredient of a more innovative public sector, a number of the organisational and institutional elements – the culture, the organisational structures, the capabilities, the resource allocation processes, the governance and supporting management systems (including performance management and measurement), and the authority to innovate – are key determinants of an innovative public service and should be the primary focus of public sector innovation analysis. These are all proper matters for the

strategic management of any organisation, providing a framework through which managerial behaviour may be influenced in the interests of public policy. If public service innovation is to play a central role of the umbrella environmental-adjustment mechanism for the public service, and be manageable in public policy terms, then it must be strategically conceived and actively managed, neither of which applies today. The Figure 2-4 presents two sets of digital transformation in an organisation, namely enhancement and transformation.

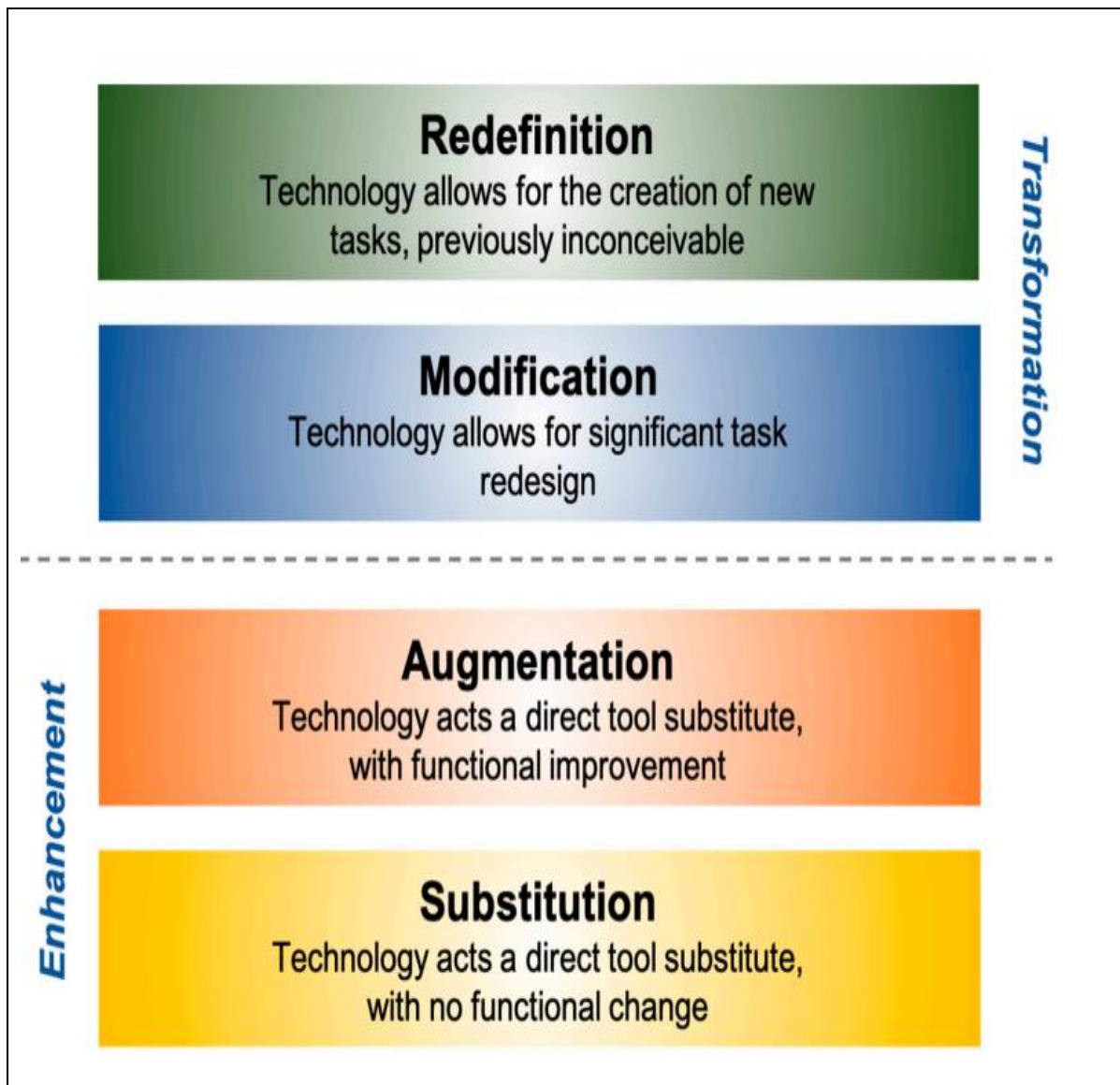


Figure 2- 4: SAMR Model: Source: Ossiannilsson (2018)

2.6.5 Critique and Limitation: Digital transformation.

Digital transformation has been widely investigated in different fields of studies, such as health, and finances. The concept of digital transformation is very significant in today's world due to continuous changes in both individuals and organisations behaviour. The benefits of digitally transform organisations have been clearly identified and studied. Even though the benefits of

digitally transform organisation by integrating emerging technologies into organisation business model. there are no clear strategies to implement emerging technologies in organisations such as local municipalities.

2.6.6 Emerging Information Technologies.

According to Terán (2018), the term emerging technologies is vague, but there are characteristics that defines emerging technologies: creating new industries or transforming the existing one, creating new investment opportunities and change the world through offering new benefits and improving people's standard of living. The element of potential to transform the society was also mentioned by Mandel (2009). Emerging technologies have got an impact on social, political, and economic scope and has triggered industrial and societal changes and transformation.

According to Koelle, Boll, Profita, Kane, Olsson, Mitchell, and Williamson (2018), emerging technologies have allowed humans to solve problems that were previously considered unsolvable; however, these technologies have brought to us new intentions, new ways of perceptions towards interactions and usage context. However, Sun, Zhai, Sheng, and Cheng (2020) do not only perceive the emerging technologies as central to societal change, but also a major influencer in public perception as it is not clear if these technologies will be best or worst thing that had ever happened to humans. On the other hand, Valle-Cruz (2018), perceive emerging technologies as beneficial in multiple ways and present more digital opportunities, particularly in the public sector. However, to exploit the opportunities presented by emerging technologies, it requires the organisations to develop new skills, competences, and education (Mergela, Edelman, and Haug, 2019).

2.6.7 Emerging technologies in government

Technologies today are presenting new opportunities for government and public service delivery, and result in public services that are now linked to services and techniques such as data mining, machine learning, sensor technology, and service automation. Through these emerging technologies public organisations can improve their efficiency, service quality by reducing service lead times, increasing transparency, and offering seamless service provision (Lindgren, Madsen, Hofmann, and Melin, 2019); and improve public participation in government matters (Veeramootoo, Nunkoo, and Dwivedie, 2018).

Bonsón Torres, Royo, and Flores (2012) observe that technologies today are considered valuable in increasing trust between government and citizens, and as a result governments worldwide are under pressures to respond to technological development by changing how they interact with citizens. Initially, the adoption of information technologies in government

(dubbed e-government) was to provide and maintain technological environment in government, however, today it is critical to public sector service delivery as it has abilities to transform how organisations operate, and further enhance interaction between government and citizens (Carter & Ubacht, 2018). The introduction of emerging technologies in government has significantly changed the dynamics of citizens-government interaction, as it is now changing how, when and where the interaction can happen. One of the hiccups of traditional governance model is geographical, and time barrier, meaning that for the transaction to be complete, citizens need to be in the physical office and within a given time. However, that is not the case with emerging technology driven business model as indicated by Lindgren et al. (2019). According to Noordt and Misuraca (2022), e-government concept has been in existence for long, however, advent of emerging technologies such as Artificial Intelligence promises to offer a better government performance due to its learning character which is very significant for organisational decision-making processes. The processes of enhancing local government service delivery through incorporating information technologies has long been here, as indicated by Irani et al. (2005).

Emerging technologies such as AI can provide automated communication by using AI based software (Androutsopoulou, Karacapilidis, Loukis & Charalabidis, 2019). Santander city in Spain was granted a million-dollar grant for emerging information technology project to install fixed and mobile sensors with the capabilities of examining parking trends, water management, waste management and personalising citizens services (Gil-Garcia, Helbig & Ojo, 2014).

Adoption of emerging information technologies in public sector benefits the organisation by saving costs, alleviating public servant workload, increase production and public services delivery and further improves citizens' satisfaction by offering a 24/7 services availability. These technologies can modify people and organisation's activities, and in government, they can also promote the redefining of what democratic government and practices are; and in local government, adopting the emerging technologies such as social media, can be interpreted as a symbol of modernity and responsiveness to citizens' demand (Haro-de-Rosario, Sáez-Martín, & Caba-Pérez, 2018). Furthermore Lember, Kettel and Tonurist, (2018) indicate that adding new technological applications in public organisations can add value such as increasing life expectancies, reduction of crime rate, shorten service delivery turnaround time, and improve trust between government and its citizens.

In 2019, Androutsopoulou et al. conducted a study by combining the design science paradigm and action research paradigm with the aim of developing a more cheaper and new reaches digitalised government-citizens communication channel which according to them it was

characterised by lower cost. However, Mergel et al. (2019), argue that little is known about transformation in public sector on their strategies and outcomes. Lember et al. (2018) suggested that public sector needs to develop what they call technological capacity, which they further define as public sector abilities to explore, develop, adapt new technologies in public service design, delivery, and evaluation; and these capacities are developed through understanding the mechanisms behind the speed, and direction of technological development and they materialise through changes in work organisation. Zuo et al. (2021) outline strategies to apply AI in government (Make AI a part of a goals-based citizen centric program, Get citizen input, Build upon existing resources, Be data-prepared and tread carefully with privacy, Mitigate ethical risks and avoid AI decision making, Augment employees; do not replace them), types of problems appropriate for AI (Resource Allocation, Large Datasets, Experts Shortage, Predictable Scenario, Procedural, and Diverse Data), broad area (AI government service, Working and social environment influenced by AI, Public order and law related to AI, AI ethics, and AI government policy), and recommendations (Define needs, Best practices for identifying departmental need, Build capacity, Human and technical building blocks required for the uptake of AI, Adapt structures: Adaptations required to existing cultural, regulatory, and legislative environments). Furthermore, Noordt et al. (2022), also identify the functionality of Artificial Intelligence in government, which include policy making, public services, and internal management, which underlines the key building block of public organisation.

Emerging technologies has become a major part of most organisation's strategies, and technologies such as artificial intelligence have been adopted in different functions of public sectors, however, in government, services are still offered the old-fashion ways and legacy systems are still getting a huge share of government budget for resources maintenance (de Sousa, 2019). In the public sector, emerging technologies are found to pose a potential to transform development and delivery of public services. However, to integrate new technologies and existing technologies requires skills and resources that are currently not available in the public sector (Alshahrani, Dennehy, and Mantymaki, 2022).

2.6.8 Emerging technologies and rural communities.

According to Cowie, Townsend, Salemink (2020), rural communities are still lagging in terms of connectivity speed, a problem that only a few countries have managed to solve, and according to Chatterjee and Nath (2015), rural communities are characterised by poverty, illiteracy, and backwardness. In developing countries, most of the digital transformation initiatives in government are failing to meet the desired outcomes (Malodia, Dhir, Mishra,

&Bhatti, 2021). David et al. (2022) indicate that it is very significant for the researchers to understand how technologies integrate into social systems.

Technologies are known to be of societal benefits, however, in little is known about the adoption of technologies in rural areas. In rural areas, ICT has the capacity to strengthen rural governance, encouraging societal transformation, ensure better quality of life and strengthening information-base for rural communities (Chatterjee & Nath, 2015). Kar et al. (2019) aver that digital transformation in developing countries is bound to benefit the citizens, however, governments cannot achieve that alone, as there is need to invest in infrastructure, skills development, and establishment of collaboration with other institutions. Furthermore, Philip and Williams (2019) argue that public policies should adequately address ICT education, training, and telecommunication infrastructure. As part of a threefold, policies play a significant role in digital transformation initiatives in organisations. However, the developing countries are still suffering from digital inequalities (digital divide and low infrastructure settings), and these have resulted from resources availability, adoption, and digital engagement (Vassilakopoulou & Hustad, 2021). Rural communities lack ICT infrastructure, and this was mentioned by Martínez-Domínguez, and Mora-Rivera (2020); Robert, Phillip, and Townsend (2017); Philip and Williams (2019), who note that the deficiency in telecommunication infrastructure is the reason rural communities are lagging in the adoption of emerging technologies.

Technologies are continuously evolving, and today we are now into the fourth industrial technological revolution which comes with great promises as indicated by Puppala et al. (2023), and some of these technologies have the capacity to bring changes to the market (disruptive), and some improve the existing market(sustainable) (Rahman, Hamid, and Chin, 2017). In support of continuous evolution of ICT, Kar et al (2019), argue that there is an emerging paradigm of ICTs which include Internet of Things and Artificial Intelligence, these technologies are expected to transform the society (Mandel, 2009). According to Verhoef et al. (2021), new technology entrance, competition, and desire to remain competitive, and consumers behavioural change signal the need for organisational digital transformation. However, in the context on municipalities in South Africa, completion cannot be a driving factor of digital transformation due to the legislative setting.

These emerging technologies are also bringing in rapid changes in organisations' business model, and organisations are now worried about their agility to respond to their customers' expectations and change in their core business processes (Mugge, Abbu, Michaelis, Kwiatkowski, &Gudergan, 2020). Ivancic, Vukusic, and Spremic (2019) argue that Information systems implementation in organisations depend on their agility capacity. There is now a growing connection between people, objects, devices, and systems, and that is changing how

organisations operate (Brunetti, Matt, Bonfanti, De Longhi, Pedrini & Guido, 2020). In addition, Lanzolla, Lorenz, Miron-Spektor, Schilling, Solinas, and Tucci (2020) observe that there is a clear relationship between digital transformation and organisation business model, as they bring to the organisation new opportunities for value creation, value delivery, and value capture. Traditional organisations are now pressured by the relationship between digital transformation and business model (Verhoef et al, 2021). Organisations are now shifting from the traditional business model into a technological-centered business model (Jafari-Sadeghi, Mahdiraji, Alam, & Mazzoleni, 2023). However, to achieve that, organisations need to have the right infrastructure to benefit from that digital transformation and business model relationship. Roztocki, Soja, and Weistroffer (2019) noted that ICTs have a significant role to play in societal development aspect such as organisation and service delivery, and they further note that there are multiple frameworks in societal economic development.

2.6.9 Digital transformation frameworks.

Digital Transformation in the public sector should be looked at holistically. Thus, the researcher should look at the initiative from an individual(citizens) and organisational perspectives. Therefore, the research was prompted to examine individual and organisational perspectives and theories supporting digital transformation. According to Pihir, Tomičić-Pupek, and Furjan (2019), the digital transformation initiative's main outcome is to develop a new business model and new products, improve the existing products and services, and deliver them to the market.

McKinsey's digital framework: the model is also called 4Ds, as it comprises four constructs starting with Ds: Discovery, Design, Delivery, and De-risk. The model puts customers first by looking at their behaviour trends in its Discovery phase. The design phase involves organisations reinventing and prototyping new organisational capabilities. The Capgemini digital transformation framework also involves understanding customers first and sharing a similar approach with MIT's digital transformation and McKinsey's digital framework (Ciruskabiri & Varnaseri, 2023).

In 2016, Berman proposed a Digital Reinvention Farmwork, but this framework is still in the theoretical phase, as no evidence supports the hypothesis. This model adopts an experiences-first approach, which is more like CapGemini, MIT digital transformation, and McKinsey digital framework, as their area of focus is on understanding customers first. In its initial phase, the focus is to understand the adoption of emerging technologies, which is vital in this study as it adopts a holistic approach to developing a municipality business model. Furthermore, the model focuses on the change in how the organisation operates, thus reinventing the

organisation's business model and developing new organisational expertise, thus digital capabilities, which are also a core component in CapGemini digital transformation frameworks, as a supporting factor of digital initiatives (Nwaiwu, 2018).

2.7 Managers and technological innovations.

According to AlBar and Hoque (2017), in rural areas, managers innovativeness in ICT adoption and ICT knowledge are the significant factors in the organisation's digital transformation. Disruptive innovations are bringing fear to the organisation's top managers in different industries including government and they always fear that the emerging technologies will outpace their capabilities (Mugge et al, 2020). In terms of employment, public sector is more rigid, when it comes to adjusting labour force when addressing technological change.

Managers' dominant role in developing dynamic capabilities has been widely recognised, especially in reconfiguring the resource base (Breznik & Lahovnik, 2014). According to Andersson and Evers (2015), managerial capabilities are one key capability found in an organization's dynamic capabilities by exploring the definition of dynamic capabilities by Zahra, Sapienza, and Davidsson (2006) who define dynamic capabilities as the ability to reconfigure an organisation's resources and routines in the manner envisioned and deemed appropriate by its principal decision-maker. The three authors put the managers at the centre of dynamic capabilities-building processes. According to Ambrosini and Altintas (2019), a manager's capabilities are key to an organisation's performance and are at the centre of the organisation's strategic change and organisation renewal. Hence, it is important for them to be able to create, extend, or modify how an organisation makes a living in for-profit firms or fulfils its mission in non-profit organisations, including through changes in organisational resources and capabilities.

According to Arend and Bromiley (2009), dynamic capabilities allow the organisation to alter its operational capabilities(ordinary) with the involvement of the organisation's management. These managerial capabilities are mainly concerned with the organisation maintaining/ gaining competitive advantage and improving performance through developing entrepreneurial activities such as sensing, seizing, and transforming the organisation's resource base (Ambrosini & Altintas, 2019). According to Breznik et al. (2014), managers are key to developing organisational capabilities because if their perceptions of one situation are wrong, this might trigger the wrong dynamic capabilities. In their study, Zahra et al. (2006), found that an organisation manager's perception of opportunities, willingness to adapt, and ability to implement are keys to an organisation's responses to change. Triggered by a dissatisfying organisational performance and availability of funds, managers may independently initiate

change if they perceive external environmental change (Ambrosini et al., 2019). This means that organisations can refuse to pay attention to the environmental change or invest in the wrong capabilities. In the case of local government, managers who do not believe in advanced technologies can simply ignore citizens' technological demands.

Helfat and Petarf (2015) signal the importance of managers' and organizations' adaptation responses to changes. Linden, Bitencourt, and Neto (2018) argue that the improvements and new capabilities are triggered and commanded by managers rather than those emerging from daily practice. However, in the public sector, the manager's roles differ slightly from the private sector. Hence, Rosacker and Olson (2008), assert that managers should not assume that the determinants of successful implementation of information systems are like the ones in the private sector. This is because of the difference in the business model and organizational structures. Daub et al., 2020, indicated that public sectors are faced with the coordination of numerous actors, which is a foundation of divergence of interest and lack of hierarchical control, vast scope, and a high number of services that require digital transformed, resulting in straining available resources, limited capabilities, not engaging user about digital transformation initiatives and generating support from civil servants, politicians, and the general public as significant challenges by managers in public sector digital transformation programs.

2.8 Capabilities and Competences to deliver successful digital government.

Organizational capabilities represent "the ability of an organisation to perform a coordinated set of activities, utilising organisational resources, to achieve a particular result (Dixon et al. Year). Different authors, such as Easterby-Smith, Lyles, and Peteraf (2009) have categorised capabilities into two categories, which are ordinary (operational) capabilities and dynamic capabilities. Huo, Zhao, Li, and Li (2022) gave a general definition of capability by defining capability as an individual or organisation's capacity to undertake an activity. From the definition, capabilities are resources that an organisation or individual can develop or build through learning and other knowledge-transferring techniques. Andersson and Evers (2015) indicate that organisations need to develop new capabilities to respond and identify new opportunities based on the extraction of dynamic capability theory.

By developing and building these capabilities, organisational managers can "integrate, build, and reconfigure internal and external resources, skills, and functional competencies to address rapidly changing environments. In their argument, Arend and Bromiley (2009) indicate that organisational capabilities should not be measured when an organisation performs well, and we must still say it has that ability when it performs poorly. Hence, Zahra, Sapienza, and

Davidsson (2006) suggest that an organisation's dynamic capabilities vary with strength, meaning that an organisation's responses to changes may vary. According to Berman (2012), the organisation must develop certain capabilities to respond to changes in its surroundings. However, according to Teece (2007), sensing, seizing, and transforming are three fundamental capabilities organisations need. On the other hand, Breznik and Lahovnik (2014) identified five relevant organisational capabilities extracted from the literature: managerial capability, marketing capability, technological capability, R&D capability, innovation capability, and human resources capability.

However, organisation performance superiority does not reflect the existence or inexistence of dynamic capabilities, and environmental stability does not determine whether capabilities are dynamic (Zahra et al., 2006). Johnson, Christensen, and Kagermann (2008) offered a clear example of an organisation perfectly responding to the environment; Apple (2007) increased its operations by developing a product that was already there in the market. Diamond Multimedia and Rio were the first movers; however, Apple did not only come up with the same technology as Diamond Multimedia and Rio, but they also came with the same technology wrapped in a great business model. This shows that technologies go hand in hand with the development of great business models. This also supports Carr's (2003) statement that IT cannot be a source of an organisation's competitive advantage, as there is a need to support Information Technologies by adopting other capabilities such as business model innovation capability and managerial capability.

However, this was argued by Zollo and Winter (2002) that the "learned and stable pattern" and "systematic" show that dynamic capabilities are structured and persistent, which translates into organised and purposefully/intent; this makes their definition aligned with the definition given by Easterby-Smith et al. (2017), who also touched on the organisation purposefully modifying their resources base. However, what is more interesting from Zollo and Winter's definition is the structure of the learned activities; hence, they argue that an organisation that adapts in a creative but disjointed way to a succession of crises does not exercise a dynamic capability. This means that for the organisation to run, it depends on capabilities such as those listed by Breznik and Lahovnik (2014). However, with uncertainty due to environmental dynamism, it is important for organisations to build on existing capabilities to sense, seize, and transform their resource base in response to environmental change. According to Osisioma and Nzewi (2016), an organization's ability to sense environmental change and respond readily is an important determinant of success.

Dynamic capabilities are classified as operational or dynamic (Schoemaker et al., 2018). Operational capabilities are responsible for the organisation's daily operations (Dixion et al.,

2017), also called ordinary capabilities. However, the two have different roles to play in the organisation. According to Kump, Engelmann, Kessler, and Schweiger (2019), the role of dynamic capabilities is to assist the organisation in modifying its existing resource base, which is a core of an organisation as mentioned by Eisenhardt et al. (2000), transform it intentionally to align the strategic assumptions, thus, reinventing the organisation's resource base.

Ordinary capabilities generate value for a firm (Kump et al., 2019). From a local government perspective, they generate customer value by delivering quality services to the citizens. In contrast, dynamic capabilities extend, modify, and create ordinary capabilities. According to Park and Kim (2013), dynamic capabilities are the organisations' competence to cope with a dynamic environment. However, Davenport and Westerman (2018) indicate that for the organisation to cope with dynamism in the ecosystems they operate in, it requires combining people, technology, and business processes. Furthermore, it also requires the organisation to continuously monitor and intervene from the top to ensure that both digital leaders and non-digital leaders are making good decisions about their transformation.

2.8.1 Ordinary Capabilities (operational capabilities)

Every organisation relies on its own capabilities and routines to operate and make a profit. According to Schoemaker, Heaton, and Teece (2018), there are two categories of capabilities: ordinary capabilities and high-order capabilities. Teece (2017) indicates that ordinary capabilities consist of the processes that deploy people, facilities, and equipment to carry out the firm's current business. Zarha et al. (2006) refers to ordinary capabilities as substantive or functional capabilities, which are sets of abilities and resources that go into solving a problem or achieving an outcome. Ordinary capabilities are key competencies to each organization's performance; however, possessing ordinary capabilities alone will rarely suffice to support the long-term competitive advantage, particularly in VUCA worlds, and they can even distract from preparing for the future. Organisations can rely on their ordinary capabilities to generate income and remain competitive, but there is a need for an organisation to build some level of capabilities. According to Teece et al. (2017), micro foundations (dynamic capabilities) allow the organisation to integrate, reconfigure, add, or subtract resources, including ordinary capabilities. Ambrosini and Altintas (2022) indicate that building and developing dynamic capabilities requires organisation managers' involvement.

2.8.2 High-order capabilities.

However, for organisations to respond to the external environment and align external demands, organisations also need to develop high-order capabilities to assess and channel

other capabilities and resources, as indicated by Kump et al. (2019) who suggests that the role of high-order capabilities to enable the organisation to modify the organisation's ordinary capabilities. This was also supported by Dixon et al. (2017) who argue that organisations should be able to develop their operational (ordinary capabilities) into dynamic capabilities, thus allowing the organisations to renew their competencies to match the changing environment. This can be attained by organisations developing absorptive and innovation capabilities. These high-order dynamic capabilities are clustered or grouped into three categories (sometimes referred to as classes) by Breznik et al. (2016): Sensing, Seizing, and Transforming, which, according to Teece (2007) involves evaluating opportunities and threats, seizing opportunities, and managing threats and transforming the organisation.

2.8.3 Dynamic Capabilities.

Consumer demands, technological evolutions, and new regulations are resulting in turbulence in different forms of organisation, and this uncertainty is also a result of customers' expectations. To respond to this, organisations need to re-investigate their development strategies, especially their capabilities (Osisioma & Nzewi, 2016). An organisation needs to sense latent environmental demand to further understand the industries in which organisations operate; organisations need to develop dynamic capabilities, which, according to Osisioma et al. (2016) will help the organisation in the creation of capabilities to address threats and exploit opportunities created by the changes in the environment to drive performance.

Since its introduction in 1997 by Teece et al (1997), the concept of dynamic capability has been an area of interest in academic research, however, Winter (2003) indicates that other scholars are more sceptical about the value of dynamic capabilities in an organisation. Dynamic capability is closely related to the resource-based view (Helfat & Peteraf, 2009), and it has largely been used to build an understanding of an organisation's core competencies and organisational performance, skills, resources, and functional competencies. The theory of dynamic capability has been influenced by traditional approaches such as distinctive competencies, organisation routines, absorptive capacity, and core competencies (Easterby-Smith et al., 2009).

According to Helfat and Peteraf (2009), the topic of dynamic capabilities in the organisation is broad and complex, and it spans multiple levels of an organisation, including strategy process and content, and involves multiple levels of analysis, from managerial decision processes to organisational routines, to competitive interactions and environmental change. According to Kaltenbrunner and Reuchel (2018), dynamic capabilities represent high-level organisational

activities and can govern other capabilities. The organisation's strong capabilities determine the foundation to respond to environmental turbulence.

However, Kevill, Trehan, and Easterby-Smith (2017), describe dynamic capabilities as the capacity an organisation can purposefully create, modify, and extend its resource base to develop. On the other hand, Zollo and Winter, (2002) proffer a different dimension of dynamic capabilities by defining it as a stable pattern of collective activities learned by a particular organisation with the aim of systematically modifying their operation routines and improving organisation effectiveness. Organisational capabilities can improve, decay, or remain unchanged, and they can take on multiple roles in organisations, such as changing resource allocations, organisational processes, knowledge development, transfer, and decision-making (Easterby-Smith et al., 2009). However, the organisation's strategies in response to environmental change determine the decision an organisation can take.

These high-level activities are not observable or visible; they are only visible when the organisation's ordinary capabilities, training, knowledge, coordination, and reconfiguration become operational (Kaltenbrunner et al., 2018; and Easterby-Smith et al. 2009). Hence, Kevill et al. (2017) assert that dynamic capabilities are potentials, not actions. Furthermore, in their distinction between capabilities and dynamic capabilities, Kaltenbrunner et al. indicate that capability will only become a dynamic capability when the velocity of capability responds to the velocity of environment dynamism. This aligns with the definition of capabilities, mainly focusing on the organisation's response to environmental changes.

In the public sector, innovation aims to create or improve public value, and it can take three dimensions: service innovation, collaboration, and procurement, and it aims to improve organisation efficiency and effectiveness. In the public sector, innovation is initiated by politicians and managers, and it strengthens their development of routinised and highly routinised (Gullmark, 2021). The concept of dynamic capabilities was developed by scholars in management to investigate how organisations can obtain a competitive advantage in turbulent environments (Dixon et al., 2014); Santa-Maria, Vermeulen, and Baumgartner (2021). However, what is not clear is the micro-foundations on which dynamic capabilities are built. In their study, Dixon et al. (2014), address the question of the origin of dynamic capability. They identify adaptive and innovation capabilities as two types of dynamic capabilities. Adaptive capability is aligned with the organisation's ability to exploit and deploy; on the other hand, innovation is aligned with exploration.

Easterby-Smith et al. (2009) point out that the bases or determinates of dynamic capabilities are its micro-foundations, defined as distinctive skills, processes, procedures, organisational structure, decision-making, and discipline. Hence, Kaltenbrunner introduced the multi-

perspective fit as a second level of dynamic capabilities. In support of Easterby-Smith et al. (2009) , Kevill et al. (2017) also point out the combination of skills, knowledge, and individuals as factors of dynamic capabilities, and these factors are also known as micro-foundations of dynamic capabilities. Froehlich, Bitencourt, and Bossle, (2017) further indicate that these micro-foundations allow organisation implementation of dynamic capabilities (sensing, seizing, and transforming) to operationalise through routines and processes.

2.8.3.1 Sensing Capabilities.

According to Teece (2018), sensing activities include scanning the environment and by collecting data from external sources, processing them, and generating information; by doing this, organisation managers can understand their customers' demands and technological possibilities and further understand other forces that may affect the future of the organisation.

Sensing capability: To identify opportunities, firms need to continuously scan their environments and search for opportunities that are constantly opening inside and outside the firm's boundaries. Typical activities or practices comprising sensing capability are scanning for new inventors or exploring market needs, practices in the R&D process that enable the creation of new or improved knowledge, and activities that result in understanding technological transformation. Sudrajat, Saroso, Lasmy, Herlina, and Syahchari (2019) indicate that sensing is important to an organisation in developing and providing new products and services and can be driven by cautious customer demand and availability of emerging technologies.

2.8.3.2 Seizing Capabilities.

Seizing capability: When opportunities are sensed, they then need to be seized, and their value and potential must be recognised. Seizing capability means selecting the 'right' technology or recognising the target customers. According to Alford et al. (2017), seizing involves organisations' improvement in technological competencies and may require the organisations to invest and collaborate with technological service providers. This means that as part of their capability building, organisations must also develop collaboration capabilities to ensure that they can benefit from external relationships.

2.8.3.3 Technology Absorptive Capacity.

Liu, Ke, Wei, and Hua (2013) indicate that ISCs are key factors for the development of higher-order capabilities, such as the AC. In fact, some IS functions, such as developing knowledge repositories, effective information retrieving mechanisms, or enabling collaboration and

communication between knowledge producers (experts) and knowledge seekers, play a key role in the firm's AC enhancement (Ashrafi et al., 2006).

Reconfiguring capability: When opportunities are sensed and seized, then they need to be reconfigured. Reconfiguring capability means re-combining and reconfiguring the resource base to address changes and opportunities in the firm's environment. Reconfiguring capabilities are the organisation's ability to alter the resource base, create, integrate, re-combine, and release resources.

The literature by Calle, Freije, Ugarte, and Larrinaga (2020) shows that product-service innovation requires three complementary digital capabilities, which are intelligence capabilities, which is the ability to configure hardware components of the systems in place so that it is able to sense and capture information, connecting capabilities, which is the ability to connect devices over the network and lastly, the ability to utilise the captured data to generate information, thus assisting the organisation in making informed decisions.

2.8.3.4 Critique and Limitation: Dynamic capabilities.

Dynamic capabilities model by Teece provides an overview on how organisation can respond to organisation ecosystems which is dynamical changing. The elements of dynamic capability model (sensing, seizing and transforming) are clearly articulated on how they can enhance organisation transformation. However, the three elements of the dynamic capability model do not give clear details on the necessary steps or procedure to follow when employed. E.g. there is need to have clear details on how organisations more especially in public sector like local municipalities can develop strategies to enable digital transformation as a response to environmental dynamisms.

2.9 Challenges of being Smart/Intelligence government.

According to Sivarajah, Irani, Weerakkody (2015) adoption of emerging information technologies in government is very different to the private sector. This is due to pressure on government officials to retain accountabilities on the public finances spending. Gil-Garcial, et al. (2014) describe the smart technologies transformation as a challenging path, and one reason is that new technologies do not come with a framework to assist organisations on how to adopt those new technologies into their business model (Lember, et al, 2018). Lack of expertise to exploit AI, ethical and social barriers rooted in employee's perception that automated machines will take away their jobs are some of the challenges outlined by Androutsopoulou et al. (2019). However, Lindgren et al (2019) suggest that there is a need for public sector to strike a balance between technologies and human, which task should be

handed to human and which task should not be completed by human beings even though technologies are more efficient than human beings, more especially on government citizen's encounter.

Furthermore, the starting point of the systematic literature review study conducted by Falco, (2018) was that local governments are found to be reluctant to engage, adopt and use digital platforms in their public policy and in service delivery. They further identified major challenges hindering adoption and taking advantage of opportunities presented by emerging technologies. Twizeyimanaa, and Andersson (2019) highlight that most of digital transformation activities in least developed countries are failing because of challenges such as a large digital divide, inadequate e-infrastructure and a lack of skills and competencies for design, implementation, use and management of e-government systems.

The study by Datta, Walker, and Amarillo, 2020, discovered that digital literacy is one of the significant challenges affecting digital transformation in the public sector on both ends (civil servants and citizens). Both managers and employees cannot promote and support adopting digital solutions, although offices are overcrowded. The study also discovered that older people lack the competencies to use digital solutions.

The study by Kumar, 2020, discovered that slow progress towards infrastructure that supports digital transformation, inability to customize applications to suit local citizens' needs, the digital divide in rural communities (rural connectivity and services), lack of clarity in policies, contracting to people who lack skills, knowledge, expertise and capabilities, lack of knowledge and awareness towards information systems and security are significant challenges affecting digital transformation in India, which shares some similar characteristics to South Africa.

2.10 Perception towards Technological Innovation.

Although perceptions of adopting innovation (Table 2.1) are found to be identical across organisations, however, organisations are composed of groups with different values and goals. Hence, it is important to understand different stakeholders within the organisation (De Vries, Tummers, and Bekkers, 2017), who, according to (Eze & Chinedu-Eze, 2017), are enablers of a successful innovation process. This suggests that adopting innovation is not one-dimensional. Bekkers and Tummers (2018) support this view by indicating that in the public sector, innovation is on the agenda of politicians, civil servants, social organisations, companies, and citizens, whom, according to Schaarschmidt, Walsh, and Evanschitzky (2017), can provide a valuable knowledge into the organization.

Table 2.1: Perception towards innovation.

<ul style="list-style-type: none"> • Relative advantage 	<ul style="list-style-type: none"> • The degree to which an innovation is perceived as better than the idea it supersedes
<ul style="list-style-type: none"> • Compatibility 	<ul style="list-style-type: none"> • The degree to which an innovation is perceived as being consistent with the existing values, past experiences, and needs of potential adopters
<ul style="list-style-type: none"> • Ease of use 	<ul style="list-style-type: none"> • The degree to which an innovation is perceived as easy to understand and use
<ul style="list-style-type: none"> • Trialability 	<ul style="list-style-type: none"> • The degree to which an innovation may be experimented with on a limited basis
<ul style="list-style-type: none"> • Observability 	<ul style="list-style-type: none"> • The degree to which the results of an innovation are visible to others

Perception towards innovation; Source: Vries, Tummars and Bekkers, 2017.

There is a significant change in scholars' perspectives on innovation. They argue that innovation is not only an activity organised from within, as the organisation can sponsor the initiative. However, nowadays, innovation is an open process of collaborating between both organisation and stakeholders. From its origin, innovation was seen as an invention and entrepreneur; however, today, the researcher considers innovation a process of collaboration and creation in response to societal challenges (Bekkers & Tummars, 2018).

According to Phippen, Raza, Butel, and Southern (2011), private organisations are innovation leaders. However, these innovations are filtered into other industries, mainly the public sector. Transferring knowledge and skills between these two sectors (public and private) has proved difficult because of different goals and environments, such as political influence (Phippen et.al., 2011). In their study, Bekkers and Tummars (2018) further identify four main types of innovation, which are: (1) process innovations, (2) product or service innovations, (3) governance innovations, and (4) conceptual innovations. All these four types of innovations relate to the key elements of the business model framework.

2.11 Digital transformation strategies.

According to Mergel (2019), digital transformation is the organisation initiative to rebuild their business model in response to customers' needs using technological innovations.

Furthermore, Mergel, 2019, further indicated that digital transformation changes how organisations deliver services, interact with customers, monitoring and controlling services, transform production, and enhance customer relations. Tonder et al., 2020, indicated that digital transformation aims to create new possibilities for organisations than a simple technology change aiming to solve past organization problems, however, in the public sector, the outcome is a change in service delivery, bringing in more efficiency and effectiveness (Mergel, 2019).

According to Echeberria (2020), digital transformation initiative is one of the organisation's initiatives that involve key business operations and affect organisation products, processes, structure, and management concepts. Therefore, organisation management must establish a practice to govern digital transformation initiatives, as there is no universally accepted conceptual framework for digital transformation (Tonder et al., 2020).

According to AlNuaimi et al., 2022, technological change in the environment requires organisations to respond, and organisations should balance both internal and external changes, and if internal changes are slower than outside changes, the end of that organization will be nearing. Emerging technologies such as artificial intelligence are perceived as valuable in organisations due to its abilities to cut operational costs, change how the organisation operates, coordinate productivity, and enhance the quality of services; hence, it is now hard to ignore the technological components in organisations.

According to Weerakkody et al., 2016, government institutions are now DEST (digital-enabled services transformation programs aiming to change and improve how they deliver services to the citizens). Public sector organisations are adopting different approaches to DEST (Mergel, 2019), aiming to connect to many citizens at a lower cost (Patterson & Agarwal, 2023). However, Weerakkody et al., 2016, argued that most DEST programs in different countries are not yielding substantial outcomes due to isolation rather than an integrated component of organisation changes. This means that digital transformation programs should be part of organisational strategies. According to AlNuaimi et al., 2022, another reason why some public organisation digital transformation initiatives are failing, is because leaders are rushing into investing in initiatives and hoping for the best, and in most cases, it ends as an expensive digital transformation failure. This is due to the growing disconnect between rhetoric and reality, accompanied by the ongoing strategy–execution gap, lack of administrative skills, data availability, lack of resources, lack of technological capabilities, which are very critical for digital transformation. Pihir (2019) indicated that, strategy orientation, customer centricity, ICT and processing infrastructure, talent, capability, capacity strengthening, innovation culture, and organizational commitment. From a strategic perspective, digital transformation can be looked

at in four strategic dimensions, which are: the use of technologies, value creation, structural changes, and financial aspects. Thus, digital transformation must be considered as an organisation's strategic renewal that fits the organisation's digital alignment. In their study, Tonder, 2020, regards digital transformation as a variety of elements, such as strategy, digital capabilities, managerial competence, customers, information, and infrastructure. According to Shaughnessy, 2018 organisations need to remain competitive in this digital era and enhance customer value creation. For that reason, organisations need to change technically and culturally to enable digital transformation initiatives. According to Berghaus & Back, 2017, digital transformation constitutes an organizational innovation process; therefore, the initial phase involves experimenting, assessing opportunities, and collaborating to define the direction, actors, and approach before starting a digital transformation program. Zaoui & Souissi, 2021, proposed a digital transformation framework comprising three building blocks (digital-driven business strategies, enablers/ capabilities, and catalysers). According to Rueckel et al., 2020, outlined nine factors that enable the digital transformation (innovative organisational culture, internal and external collaboration, strategic embeddedness, digital leadership, digital platform infrastructures, bimodal IT structures, institutionalised innovation processes, individual creativity and innovation capabilities, and ICT literacy) divided into four categories (organizational values, management capabilities, organizational infrastructure, and workforce capabilities) and on four managerial layers (normative, strategic, tactical, operational).

According to Chanias, Myers, & Hess, 2019, there is a need to equate organisation information systems strategies and business strategies, and digital transformation strategies do not necessarily mean replacing organisation existing strategies but aligning them. Digital transformation activities do not just happen on their own, as they are characterized by uncertainties, hence Berghaus & Back, 2017, talked about the fuzzy front end in digital transformation, which, according to them, is a non-routine task which changes the organisation identity, and does not only encompass idea generation but making decision if and where to innovate, and this have implications for multiple stakeholders and employees.

According to Zaoui & Souissi, 2020, a key to digital transformation is to have a strategic vision, as there is no shortcut to successfully implementing digital transformation. Furthermore, Chanias & Hess, 2016, indicated that digital transformation strategies serve as a central concept to coordinate, prioritize, and implement a firm's digital transformation efforts, and in addition, Otia & Bracci, 2022, indicated that a well-structured and defined digital transformation strategy is an ingredient to successful digital. Figure 2-5 shows the relationship between an organisations and digital transformation strategies.

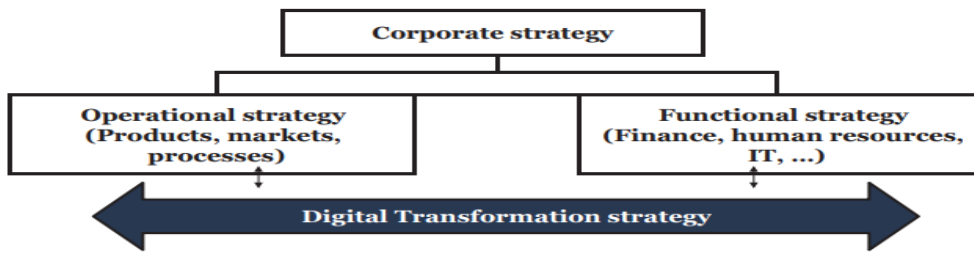


Figure 2- 5: Relationship between digital transformation strategies and corporate strategies; source, Echeberria, 2020.

Customers and environmental disturbance require the public sector to respond; however, according to (Mergel, 2019) public organisations are different from private organisations as they compete for political power, institutional legitimacy, as well as social and economic fitness. Mergel (2019) further indicated that public organisations are shaped by the interactions between elements within the environment that they operate in, rules and norms imposed on them, behaviours of their internal systems, and the cognitive patterns of their inhabitants. Thus, digital transformation initiatives in public organisations should be looked at from a broader perspective.

2.11.1 Digital transformation strategic formulation.

Chantias et al., 2021, explored the digital transformation strategy formulation in one of the well-recognised companies in the financial sector in Europe, AssetCo, which adopted a seven-phase digital transformation strategy and formulation process, shown in the Figure 2-6. According to Wang et al, 2019, a digital transformation strategy is a blueprint for digital transformation and provides managers with guidelines for integrating and using digital technologies towards digital transformation.

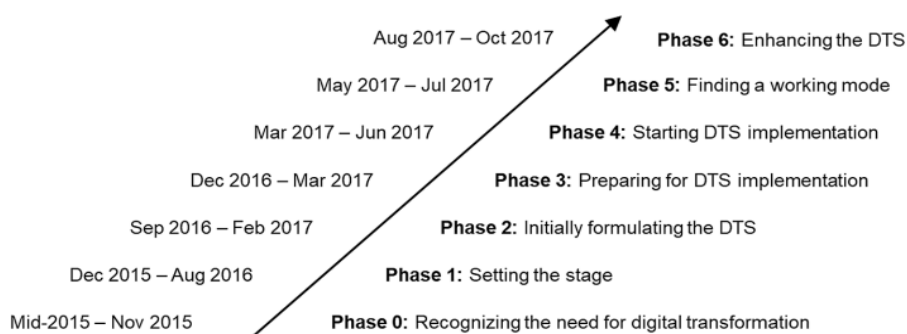


Figure 2- 6: AssetCo, digital transformation strategic formulation and implementation phases; source, Chantias et al., 2021.

Alternatively, Chantias & Hess, 2016 adopted an activity-based process to understand digital transformation strategies in the organization by introducing triggering event, strategy initiation,

deliberate strategy, emergent strategy, and realized strategy as the elements of digital transformation strategic formulation based on three automotive groups. Figure 2-7 shows how the three companies approached digital transformation based on the five elements proposed by (Chaniyas & Hess, 2016).

	Car Group A	Car Group B	Car Group C
Triggering event	<i>External:</i> Competitor pressure (by incumbents and new entrants) and changing customer needs <i>Internal:</i> Desired cultural change	<i>External:</i> Competitor pressure (mainly by new entrants) and the threat of commoditization <i>Internal:</i> Desired efficiency gains	<i>External:</i> Competitor pressure (by incumbents and new entrants) and changing customer needs <i>Internal:</i> Desired efficiency gains and novel business models
Strategy initiation	In 2014/5: Strategy process initiated by the corporate strategy department	In 2014/5: Strategy discussions at board level initiated by a board member (related to sales)	In 2015: Strategy process initiated by the group sales department
Deliberate strategy	Definition of a group-wide target picture and the establishment of a digital transformation unit (reporting to the CEO) with a focus on strategy, governance, and implementation	Establishment of a digital transformation unit (reporting to a selected board member related to sales) with a focus on strategy and implementation	Definition of a group-wide target picture and the establishment of a digital transformation unit (reporting to the CEO) with a focus on strategy and governance
Emergent strategy	Various separate digital initiatives by sub-communities in the functions sales, R&D, production, and financial services – started before strategy initiation	Various separate digital initiatives by sub-communities in the functions sales, R&D, and production – started before strategy initiation	Various separate digital initiatives by sub-communities in the functions sales, R&D, and production (group and divisional level) – started before strategy initiation
Realized strategy	Predominantly shaped by emergent strategizing activities via a bottom-up process	Predominantly shaped by emergent strategizing activities via a bottom-up process	Predominantly shaped by emergent strategizing activities via a bottom-up process

Figure 2- 7: Activity-based process model: source Chaniyas and Hess, 2016.

Berghaus & Back, 2017, identified five approaches to tackling digital transformation's initial stage/steps (digital transformation strategic formulation and digital transformation). This includes a centralized approach, Bottom-up approach, IT-centred approach, Innovation-centred approach, and channel-centred approach depending on factors such as existing assets, the market context, and the situation of the company. The five approaches of tackling digital transformation initial stage are discussed below:

Organisations that adopt a centralized approach aim to seize the potential of the fuzzy front end through hackathon, innovation jams, or offsite days for ideation activities to generate ideas from the participants. Such activities may help organisations find financial solutions and eliminate other administrative barriers (Berghaus & Back, 2017).

Organisations that adopt channel centred, IT-centred, and bottom-up aims to bring silos and involve different actors in the organization. This include identifying the most essential activities for digital transformation and identifying relevant actors. This approach is also significant to organisation building the cross-functional culture and re-organising. Furthermore, these approaches may asset organisation find missing capabilities through partnerships and

collaborations. Organisations that adopt a channel, catered, and bottom-up approach relies on customer journeys to facilitate collaboration and keep focus. This involves streamlining and simplifying organisation process, building new customer experiences based on their needs, and using the customer journey to build new products or services (Berghaus & Back, 2017).

An innovative-centred approach enables cultural transformations instead of innovative lighthouse projects by disseminating learnings and methods from the innovation lab in the organization. This approach enhances the working relationship between those working in labs and those who understand the customers' needs better and the organization in general, as it will increase organisation knowledge and expertise capacity. Furthermore, innovative organisation needs to demonstrate how employees contribute to the overarching goal. This involves getting the organization's employees into initiative participation mode through incentives (Berghaus & Back, 2017)

2.11.2 Digital transformation strategic implementation.

A proposed digital framework by Correani (2020) (see Figure2-8), support an organization digital transformation by building a solid link between strategic formulation and implementation. The framework comprises the following building blocks: scope, data sources (internally and externally), data platforms, people, partners, artificial intelligence, information and knowledge, processes, and procedures, transformed activities, tasks, and services, which are explained below:

Scope- the outcome of the strategic formulation is a strategic goal that defines the organization's dreams for customers' value creation. This scope defines what the organization aims to achieve through digital transformation initiatives.

Data sources- internal and external data plays a significant role in understanding the organization (how it operates, its products, services, and tasks), customers (needs and perception), and the organization's stakeholders. Therefore, data plays a vital role in implementing digital transformation.

Data platforms- Organisations collect data from end users, usually the customer. Different data collection techniques, storage methods, and extraction models are used. Various data sources or platforms play a significant role in organization knowledge discovery processes to generate the knowledge required for digital transformation.

People- digital strategy implementation requires people with the right skills, knowledge, and expertise. This signifies digital capabilities such as leadership skills. The organization needs to embark on employee capacity-building programs such as training.

Partners- for the success of digital transformation in organisation, there is a need for an organisation to collaborate to acquire capabilities that are missing. Agree partnerships enable the organization to obtain new data, capabilities, knowledge, and competencies crucial for implementing digital transformation strategies.

Artificial intelligence (not fully unrevealed)- requires lean analytics to change the organization's business model and activities. Using this approach is a critical success factor that allows for developing better solutions to existing problems, identifying new patterns in data that promote specific actions, inferring relevant knowledge, and promoting radical and incremental improvements in products and services.

Information and knowledge- this building block has also been neglected, although it is essential as extracted information is needed to enhance individual and organizational knowledge.

Processes and procedures - digital transformation strategies require organisations to review their processes and procedures to generate customer value. Organisations' processes and procedures must be flexible to enable them to respond to the dynamic environment, which keeps changing.

Transformed activities, tasks, and services: There should be complementarity between the organization's core activities used to create customer value, tasks, and services.

Customers- this is the last building block that organisations aim to create value for their customers. It is significant to understand both organisation existing customers and new customers.

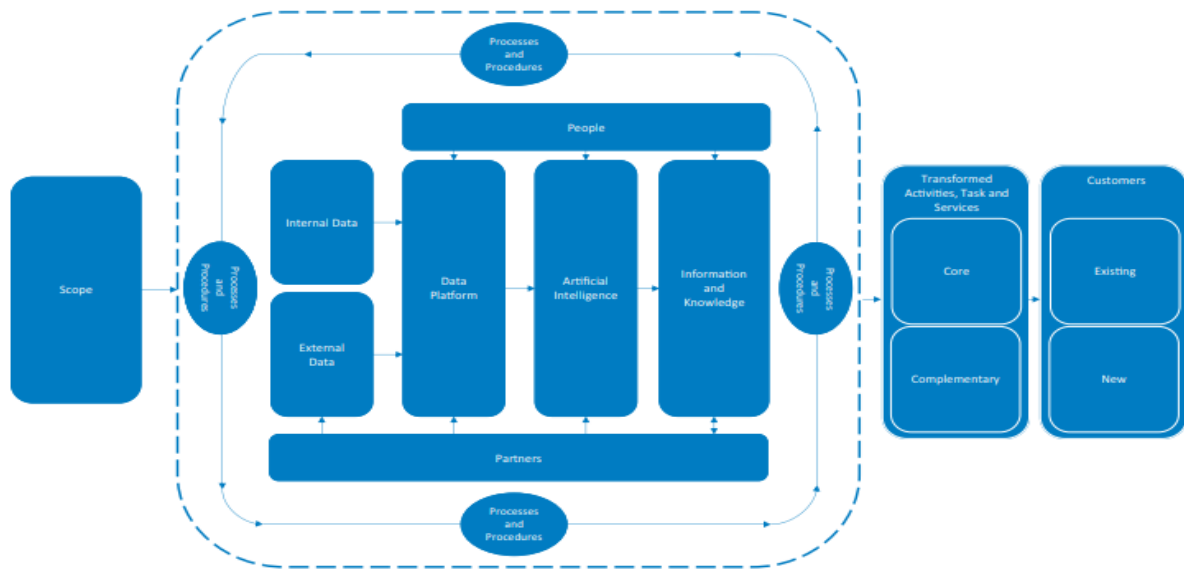


Figure 2- 8: Digital transformation strategic implementation framework, source: Correani et al., 2020.

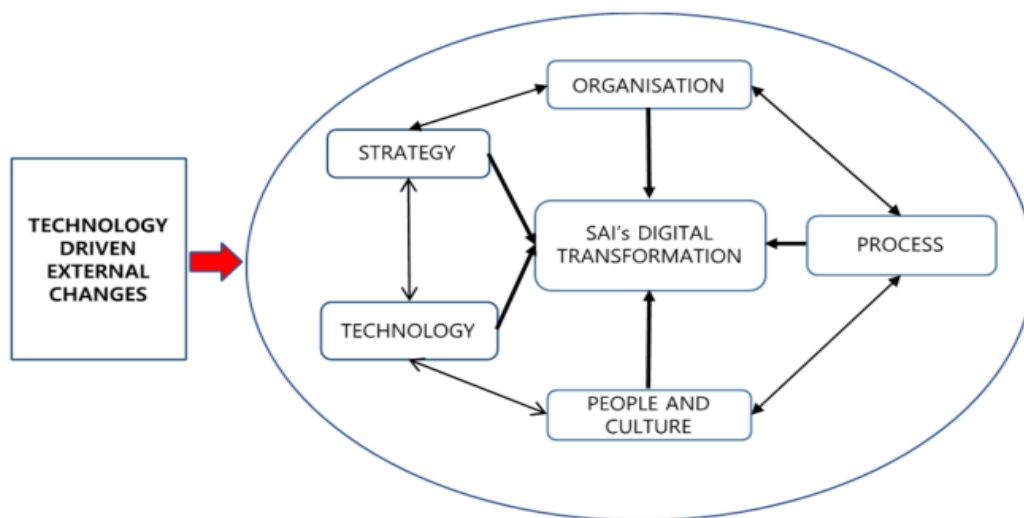


Figure 2- 9: Digital transformation framework; source: Otia & Bracci, 2022.

Otia & Bracci, 2022, proposed a framework for digital transformation shown in Figure 2-9, which comprised of related components (organization’s strategies, organization, processes, people and culture, and technology). The integration and reciprocal relationship between five dimensions show that the success of digital transformation in government is determined organisation strategies which needs to support digital transformation initiative. Organisation decision making and structure are essential for digital transformation. Technologies, processes, and people are very critical for digital transformation in organisation.

Digital transformation initiatives to reconfigure organisation business model has been long been studied, mainly in the context of private sector. This is due to the continuous technological evolution led by private sectors. However, in the context of local municipalities little is known about how they can reconfigure their business model by incorporating emerging technologies into their business model to enhance service delivery.

2.12 Chapter summary.

This chapter outlined the general description of digital transformation in public institutions in a global context. Furthermore, it gives an overview of the business model, dynamic capabilities, and innovation. Most importantly, the chapter outlined the relationship between business models, innovation, and dynamic capabilities. Lastly, in this chapter, the researcher's point of view was discussed through the conceptual framework of the digital business model for local government to enhance interaction and service delivery. The next chapter (three) outlines the theoretical underpinning of the study.

3 CHAPTER THREE: THEORETICAL UNDERPINNINGS.

3.1 Introduction

The adoption of emerging technologies defines an individual or organisation's decision to voluntarily first accept or operationally use emerging technologies to solve a problem (Awa, Ojiabo & Orokor, 2016). However, the previous chapter showed a slow adoption rate of emerging technologies in developing countries. The adoption of technologies has been subjected to investigation in different contexts, and as a result, there are a good number of theories established to examine user behaviour towards emerging technologies. This is supported by Panagiotopoulos and Dimitrakopoulos (2018) who observed several models to explain individual users/organisation's acceptance and use of emerging technologies. According to Kumar and Krishnamoorthy (2020) Homan and Beránek (2023), the most common models to examine the adoption of emerging technologies are TAM by Davis (1986), DOI by Rogers (1995), UTAUT by Venkatesh et al. (2003), and TOE by Tornatzky and Fleischer (1990). Olushola (2019) point out some of the determinant factors of adopting emerging technologies, intending to adopt the main factor, then followed by others such as technology readiness, compatibility, complexity, executive management support, firm size, regulatory support, security concerns, cost savings, compatibility, and relative advantage. Even though there are some most used models to explain the information technology and information systems adaption, there is no universal model in place to explain that phenomenon, hence there is a state of methodological vacuum and theoretical confusion as indicated by Kiwanuka (2015). Gangwar, Date, and Raoot (2012) suggest that the integration of models may limit the shortcoming of another model, and this is a trend which is proving to be very useful. In this chapter, the researcher reviewed the most common models in explaining individual and organisations' adoption and acceptance of emerging technologies.

3.2 Rational for Model Selection and Exclusion.

Individuals and organisations acceptances of technological innovations has been an area of focus for many scholars in the field information systems, and that led to the emergence of multiple theories designed to predict the acceptance of information technology innovations such as DOI, TAM, UTAUT and TOE (Saade´ & Bahli, 2005). Scholars such as Davis, 1989; Chau, 1996; Venkatesh and Davis 2000, are some of the most known in the development of theoretical models aimed to understand factors impacting the acceptance of information technologies or technological innovations. The study aims to understand how community members perceive the integration of emerging technologies in local municipalities, and therefore the researcher relies on the strength of DOI which is comprehensively built for

understanding the psychological and sociological explanation of the process involved in adoption of innovation among the studied population as indicated by Ali, Raza, Puah and Amin, 2019. Furthermore, the diffusion of innovation model can enable researchers to explore the factors that may influence an individual to adopt technological innovations as indicated by Nor, Pearson and Ahmad, 2010. To further strengthen the study, TAM was also incorporated due to its ability to address the impact of system characteristics on users' acceptance and further outlines the existence of relationship between system design features; perceived usefulness, perceive ease of use, attitude towards using and actual usage behaviour. Incorporating UTAUT model in this study, enabled the researcher to obtain a more exhaustive prediction of citizens behaviour towards the use of emerging technologies in local municipalities, a strength originated from synthesising eight other models, hence is a most widely used model in predicting user acceptances in both individuals and organizations settings as indicated by Ye, Zheng and Yi, 2022. To explain the role of local municipalities capabilities on individual intention to adopt emerging technologies, TOE framework was also incorporated into this study.

The researcher acknowledges the existence of other theories such as Theory of Planned Behaviour and Theory of Reasoned Action (TRA) by Ajzen and Fishbein in 1980, according to Otieno et al, 2016, put forward the three general constructs namely: behavioural intention, attitude, and subjective norm. Theory of planned behaviour, which was developed in 1991 by Ajzen who added perceived behavioural control to Theory of Reasoned Action (TRA). According to Yadegari, Mohammadi & Masoumi, 2024, perceived behavioural control is directly related to behavioural intention. Existing literature indicates that TPB and TRA are the foundation to most cited and most used models in adoption of technological innovations (TAM, DOI, UTAUT), which are theoretical extensions of Theory of Planned Behaviour and Theory of Reasoned Action. The extension of models such as TPB and TRA was due to non-responsiveness or non-comprehensiveness of previous models for newly appeared technologies (Yadegari et al.2024). Thus, extended and newly developed models offers more comprehensive understanding of emerging technologies, hence the study adopted TAM, DOI, UTAUT and TOE to offer more comprehensive understanding on adoption of emerging technologies in rural local municipalities.

3.3 Diffusion of Innovation theory (DOI)

The theory of adoption and diffusion innovation was developed by Rogers in 1962 to describe the adoption and non-adoption of new technology (MacVaugh & Schiavone, 2010). It is considered one of the earliest theories to examine factors that influence adoption of innovations and new technologies (Nor, Pearson, and Ahmad, 2010) who successfully

predicted the adoption of internet banking through diffusion of innovation constructs. According to Sanson-Fisher (2014), the theory of diffusion innovation is helpful when determining the adoption of specific clinical behaviours and when deciding which components will require additional effort if diffusion is to occur. This model is applicable at both organisation and individual levels (Ali, Raza, Puaah, & Amin, 2017).

However, its shortcoming is that it doesn't consider the external environment (Homan & Beránek, 2023) which is very significant for this study. This is supported by Akça and Özer (2014), who indicated that, the Rogers model clarifies the factors that affect innovation adoption by identifying 28 attitudes gathered in five major characteristics, namely: individual factors, innovation factors, tasks factors, organisation factors and environment factors. The diffusion of innovation model comprises of five major constructs mentioned by both Sanson-fisher (2004): Cain and Mittman, 2002, (Relative advantage, compatibility, complexity, trialability, and observability).

Relative advantage- Cain and Mittman (2002) looked at relative advantages in two facets: if the new technologies benefits will outweigh the risks of using it, and if the system will offer better benefits than the existing or alternative. According to Nor (2010) relatively advantage is perceived usefulness in TAM. This study pays attention on the second facet due to its alignment to citizen's needs. Ali et al (2017) indicate that relative advantage is perceived as the individual perception that innovation or idea will better the existing one, and this can be in terms of (security, finances, services availability, staff competences, incentives, and services charges). According to Nor, et al (2010), relative advantage requires users to analyse the cost and benefits of adopting emerging technologies and this can be expressed in a form of social, economically, or other things. In addition, Akça and Özer (2014) indicates that relative advantage can be expressed in terms of effective, efficient, satisfactory, and functional). For this study, relative advantage is measured at the economic perspective (cost), and convenient perspective (time and geographical distances) and systems capabilities).

Another construct on the diffusion of innovation model by Rogers (1995), is perceived compatibility. Perceived compatibility is defined as the degree to which innovation is consistent with existing value, experience, and needs of service or technology users (Rogers, 1995). Innovations which are more compatible in terms of three compatibility dimension will accelerate adoption of emerging technologies (Akça and Özer, 2014). Values and culture are some of the traits in acceptance of emerging technologies, and users are more likely to reject innovation if it is not aligned to their cultural values. Another dimension on perceived compatibilities is experience, perception towards innovation can also be determined by previous user's experience, thus the rate of adoption on new technologies is affected by the

old ideas or experiences. The last dimension is compatible with user's needs, which is defined as the degree at which innovation meets as felt need. Thus, users are more likely to adopt innovation if it meets their needs. For this study, perceived compatibility is defined in line with the third demission. According to Akça and Özer (2014), the diffusion of innovation model has been used in different sectors, for example, in the health sector by Emani, et al (2018), however, in their study, construct compatibility did not make an independent factor after factor analysis.

Trialability- The ability of technology adopters to trial new technologies, and according to Dillon and Morris (1996), trialability is the systems user's opportunity to try and test new systems or innovation before committing to using them.

Complexity- is a measure of the degree to which an innovation is perceived as difficult to understand and use. According to Rogers (1995), any new idea can be classified in the complexity-simplicity rang, thus a new idea may be considered difficult or easy to use. Furthermore, Rogers indicated that lack of technical expertise can lead into frustration to technological adopters.

Observability- is the degree to which the innovation results are visible to others, and the greater observability on technological innovation the more likely individuals and organisations will adopt the innovation (Nguyen, Le and Vu, 2022). According to Kumar, Engle, and Tucker (2018), there is a direct relationship between observability and the rate of adoption, hence observability is an important factor influencing the adoption decisions of early adopters. There is clear evidence that emerging technologies such as mobile payment systems, cloud computing, IoT, Artificial Intelligence are making positive impact on private sectors. Organisations in private sector are advancing in integration of emerging technologies into their business model, through digital transformation as indicated by Nguyen, Le, and Vu (2022).

3.4 Technology acceptance model (TAM)

Davis developed Technology acceptance model (TAM) in 1989 (see Figure 3.1) to explain the individual factors affecting user's acceptance of technologies. This model was established based on the Theory of Reasoned Action (TRA) and classified under the theories of Social Psychology (Al-Fraihat et al., 2020). However, according Bakkabulindi (2014), TAM was extracted from IDT, although it is more popular than the innovation diffusion theory. The study by Lee, Kozar and Larsen (2003) shows the list of variables emanated from TAM extension, and from the list, the roots of TAM are also in the Diffusion of Innovation model. According to Joo, So, and Kim (2018), this model is a more useful and, versatile, and robust (Wang et al., 2020) model in explaining user acceptance processes when new technologies emerge or are

adopted. According to Joo, Park, and Lim (2018), the original version of TAM included only perceived usefulness, perceived ease of use, attitude toward using, and behavioural intention to use. Since its origin, TAM has continuously received attention, and according to Lee, Kozar, and Larsen (2003), this model has proved to be accurate in measuring user acceptance behaviour, in different technologies, situations and tasks.

TAM has received some major criticism as others perceived it as not enough and omit some of key factors that can determine adoption of technologies such as social influences as indicated by Kiwanuka (2015); however, additional settings have been incorporated into TAM through external variable to enrich the strength of TAM. According to Homan and Beránek (2013), in terms of predicting behaviour intention and actual use, TAM accurate level is between 40% and 50%, hence there is a need to incorporate it with other models to increase its predictive power. According to Venkatesh (2008), individual differences, system characteristics, social influence, and facilitating conditions are some of the constructs that emanated because of extensions in TAM. The study by Teo (2009), titled “Modelling technology acceptance in education: A study of pre-service teachers” is an example of use of external variables in TAM, and by doing so, the author managed to broaden the view and explanation of adoption in technologies. Furthermore, another critique of TAM is attached to its name technology acceptance model as the term technology in technology acceptance model means that it is mainly developed to explain IT innovation, as indicated by Venkatesh, and Bala (2008) that TAM was developed to predict individuals’ adoptions of IT.

This model by Davis proposed perceived ease of use and perceived usefulness as factors that affect individuals’ behaviour intention to use leading into actual use (Zhao et al., 2018).

Perceived usefulness- the study by Johar & Awalluddin (2011) defined perceived usefulness as the degree to which a person/individual believes that using a particular system would enhance his or her job performance. Lederer, Maupin, Sena, and Zhuang (2000) furthered this by indicating that emerging technologies may be perceived as useful if they enhance individuals’ work or job by reducing the time to accomplish tasks or providing timely information. Perceived usefulness is mainly focused on the processes and outcomes of job performances (Teo, 2009)

Perceived Ease of Use- which is defined as the degree to which a person believes that using an IT will be free of effort (Venkatesh, 2008). In contrast to perceived usefulness, perceived ease of use is mainly concerned with the factors related to processes when using technologies.

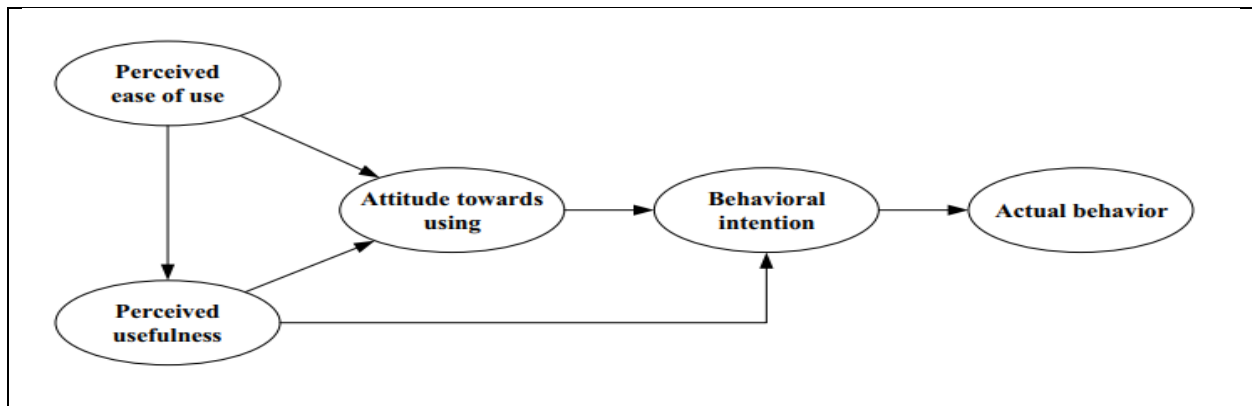


Figure 3- 1: *Technology Acceptance Model*; source Davis, 1989

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

According to Carlsson, Carlsson, Hyvönen, Puhakainen, and Walden (2006), several modifications have been made to the original TAM, and as a result, have led to a more prominent model which is found to be outperforming other models in the field of IS when using the same data explaining about 70% of the variance in behavioural intention and 50% in technology use, UTAUT (see Figure 3.2) was found to be outperforming the other eight models (Dwivedi et al., 2019). According to Kiwanuka (2015), this model has widely been used in examining users' behaviour intention to adopt emerging technologies or innovations and usage of technologies. Kiwanuka, further, criticised the use of UTAUT due to lack of trust and benefits as determinants of emerging technologies adoption. Emerging technologies are characterised by uncertainty; hence, scholars have discovered safety issues and benefits associated with adoption and use of emerging technologies.

The UTAUT model was developed from the review, mapping, and integration of multiple theories which include the Theory of Reasoned Action (TRA), the Technology Acceptance Model (TAM), the Motivational Model, the Theory of Planned Behaviour (TPB), a combined TBP/TAM, the Model of PC Utilization, Innovation Diffusion Theory (IDT), and Social Cognitive Theory (SCT) (Rana et al., 2014; Bakkabulindi, 2014). This gives UTAUT more strength as it emanated from the combination of constructs from eight other known and dominant models or theories.

Williams et al. (2014; and Kiwanuka (2015) asserted that the UTAUT model comprised of four main constructs: performance expectancy, effort expectancy, social influence, and facilitating conditions, which are direct determinants of behavioural intention and, ultimately, behaviour. In addition, Dwivedi et al. (2019) indicate that the UTAUT is also comprised of four major moderators of major constructs (gender, age, experience, and voluntariness), making it

different from other prior existing models that examine individual acceptance and use of emerging technologies. Bakkabulindi (2014) noted similarities between constructs from UTAUT and IDT, which confirms that the UTAUT model was extracted from Rogers IDT. However, the UTAUT model differs from other model such as TAM and IDT as it incorporates demographic information such as gender, age, and experience as mediating factors.

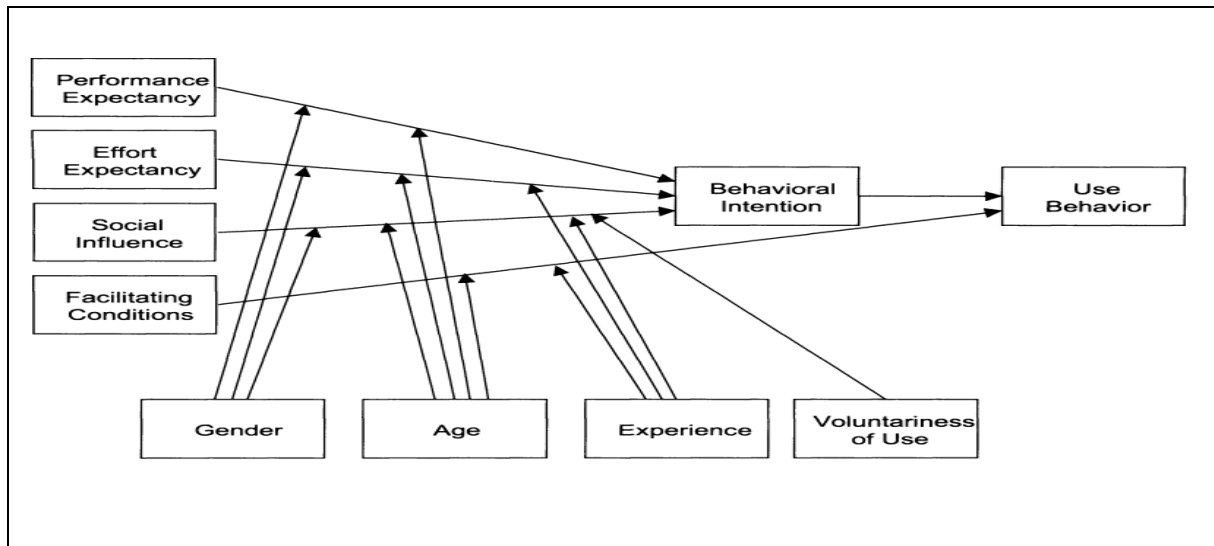


Figure 3- 2: UTAUT model. Source: Venkatesh, Morris, Davis, and Davis, 2003.

The UTAUT model as shown in Figure 3-2, is comprised of performance expectancy, effort expectancy, social influence, and facilitating condition, behaviour intention and user behaviour, which were further discussed in detailed below.

Performance Expectancy- Performance expectancy is defined as “a degree to which an individual believes that using the system will help him or her to attain gains in job performance, and according to Venkatesh, Morris, Davis, and Davis (2003), performance expectance is the strongest predictor of individual behaviour intention. Venkatesh et al. (2003) and Bakkabulindi (2014) further identify the similarities between performance expectancy and other constructs from different models such as perceived usefulness from TAM/TAM2 and relative advantage from IDT.

Effort expectancy- This is defined as the degree of ease associated with the use of the system, and according to Venkatesh et al. (2003), there are other three constructs from different models that capture the same concept as effort expectancy (complexity and ease of use).

Social influence- Social influence is defined as “the degree to which an individual perceives that important others believe he or she should use the new system. According to Inan et al. (2022), social influence has an impact on individual behaviour through three mechanisms: compliance, internalisation, and identification. In their study, Asanprakit and Limna (2023), they found that social influences are a significant determinant of social commerce.

Facilitating Condition-Facilitating condition has been defined as the degree to which an individual believes that organisational and technical infrastructure exist to support the use of the system. Facilitating conditions are originally viewed as the external control related to the environment and can be looked at as resources factor and technology factor (Lu et al, 2003). Biljon and Renaud (2008) refer to facilitating conditions as the technological infrastructure such as the mobile phone infrastructure and cost.

3.6 Technology-Organisational-Environmental Framework (TOE)

TOE was established by Tornatzky and Fleischer in 1990 as a generic framework that explains and predicts the adoption of technological innovation based on the three contexts: technologies, organisation, and environment. The three variables have given this model an advantage compared to other model testing technology adoption (Gangwar & Date, 2015). According to Homan and Beránek (2013), examples of technological factors are relative advantage, compatibility, complexity and trialability; organisational factors represent company characteristics such as size, organisational readiness, management support and availability of resources; and lastly, environmental factors are driven by government regulations and competition. According to Ramírez-Gutiérrez, Solano García, Matamoros, Escobar, and Tejeida-Padilla (2023), TOE is more suitable for evaluation of both the organisation's internal and external aspects by enabling going beyond individual users' perception of emerging technologies and enables a complete overview of directors before adoption. Gangwar and Date (2015) indicate that TOE provides a holistic picture of user adoption of technology, its implementation, foreseeing challenges, its impact on value chain activities, the post-adoption diffusion among firms, factors influencing business innovation-adoption decisions and to develop better organisational capabilities using the technology.

TOE has been adopted in both qualitative and quantitative research, and some the scholars such as Sayginer and Ercan (2020) have also combined this model with other models such as DOI. TOE combines human and non-human actors in the network by measuring adoption based on technological, organisational, and environmental contexts, thus TOE, is a multi-perspective framework which free to firm-size restrictions (Hujran, Lozi, Debei & Maqableh, 2018). Theresiawati et al. (2023) adopted the TOE to examine the factors that influence adoption of emerging technologies in village government using a mixed method research. Although Bakkabulindi (2014) pointed out to technologically focused, paying less attention to other innovations as a shortcoming of the TOE model, this study will benefit more from TOE as it aims to examine citizens' and municipalities perception towards emerging technologies. The elements of TOE (Figure 3.3) are discussed as follows:

Technological context.

Technological context in TOE comprised of factors that affect individual, organisation, or industrial adoption to emerging technologies. Bakkabulindi (2014); Gangwar, Date, and Raoot (2012) indicate that the technological context of the TOE is the reinstatement of the IDT by Rogers. According to Awa, Ukoha, and Emecheta (2016), the technological context of TOE describes the adoption of technologies internal and external to the firm as well as their perceived usefulness, technical and organisational compatibility, complexity and learning curve, pilot test/experimentation, and visibility/imagination. This shows the clear relationship between TOE technological context and IDT, due to variables commonalities in the two models.

Organisation context

The significant variables in organisational context include financial resources, firm structure, organisational slack, innovation capacity, knowledge capability, operational capability, strategic use of technology, trust, technological resources, top management support, support for innovation, quality of human capital, organisational knowledge accumulation, expertise and infrastructure and organisational readiness while financial capacity and technology competence are identified as insignificant.

Environmental context.

Significant variables in environmental context include customer mandate, competitive pressure, external pressure, internal pressure, trading partner pressure, vendor support, commercial dependence, environmental uncertainty, information intensity and network intensity, while government regulation is not identified as a significant variable.

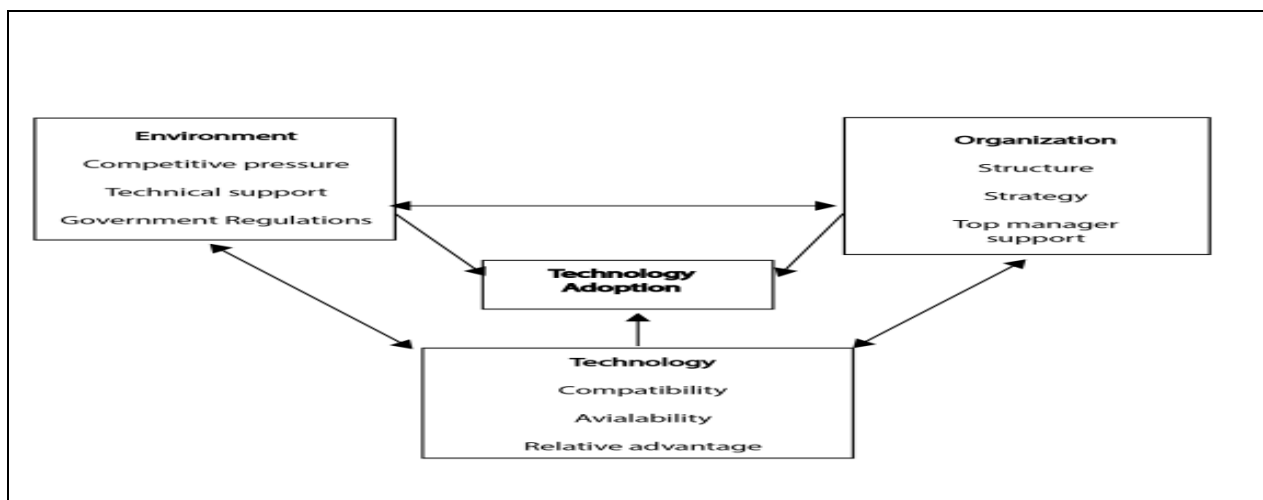


Figure 3- 3: *Technology-Organisation-Environment.*

3.7 Contextual Framework and Hypothesis building

The multiple theories reviewed portray different constructs in determining the adoption and behaviour intention to adopt technologies and technological innovations in both individuals and organisation perspective. Guided by the above discussions, this study proposed any individual model composed of six constructs extracted from DOI, UTAUT, TAM and T-O-E as shown in Figure 3.4. By combining a set of theories scholars believes that it offers better research grounds for examining the adoption of technologies while obtaining more comprehensive knowledge of that technology (Yadegari, Mohammadi & Masoumi, 2022). According to Terán (2018), even though the term emerging technology is still vague, some characteristics define it. Emerging technologies are the classification of the fourth industrial revolution and include main components such as the Internet of Things, cyber-physical systems, modern artificial intelligence, cloud manufacturing, blockchain, quantum technologies, and others (Magruk, 2021). Emerging technologies have the potential to create a new industry or transform an existing one, to provide investment opportunities, and to change the world in terms of offering new benefits and transforming standards of living. And Mandel(2009); Linkov et al. (2028) indicate that emerging technologies have potential benefits and opportunities. However, the benefits cannot be realised if they are not developed in a secure manner that maintains public confidence. This means that even though emerging technologies are seen as transformers of existing business models into new models, offer benefits, and improve the living standard of the communities, they are also associated with other challenges, and the main challenge is adoption.

The concept of emerging technologies is not immune to any industry, as indicated by Turja, Aaltonen, Taipale, and Oksanen (2020). The study “Artificial Intelligence in Government Services: A Systematic Literature Review” by Reis, Santo, and Melão (2019) suggests that much has been discussed in line with redesigning government service delivery operations through emerging technologies. However, a low level of user acceptance has been a major problem for adopting digital transformation initiatives, even though automation is perceived to offer more advantages than the traditional business model of operation. According to Valle-Cruz (2018), robots, self-serving kiosks, and ATM can perform tasks or activities that were previously known to be done by human beings, and as a result, they are replacing human beings in their daily organisation routines. In the study by Turja et al. (2020), perceived technology employment was a notable factor determining the acceptance of robots in health care.

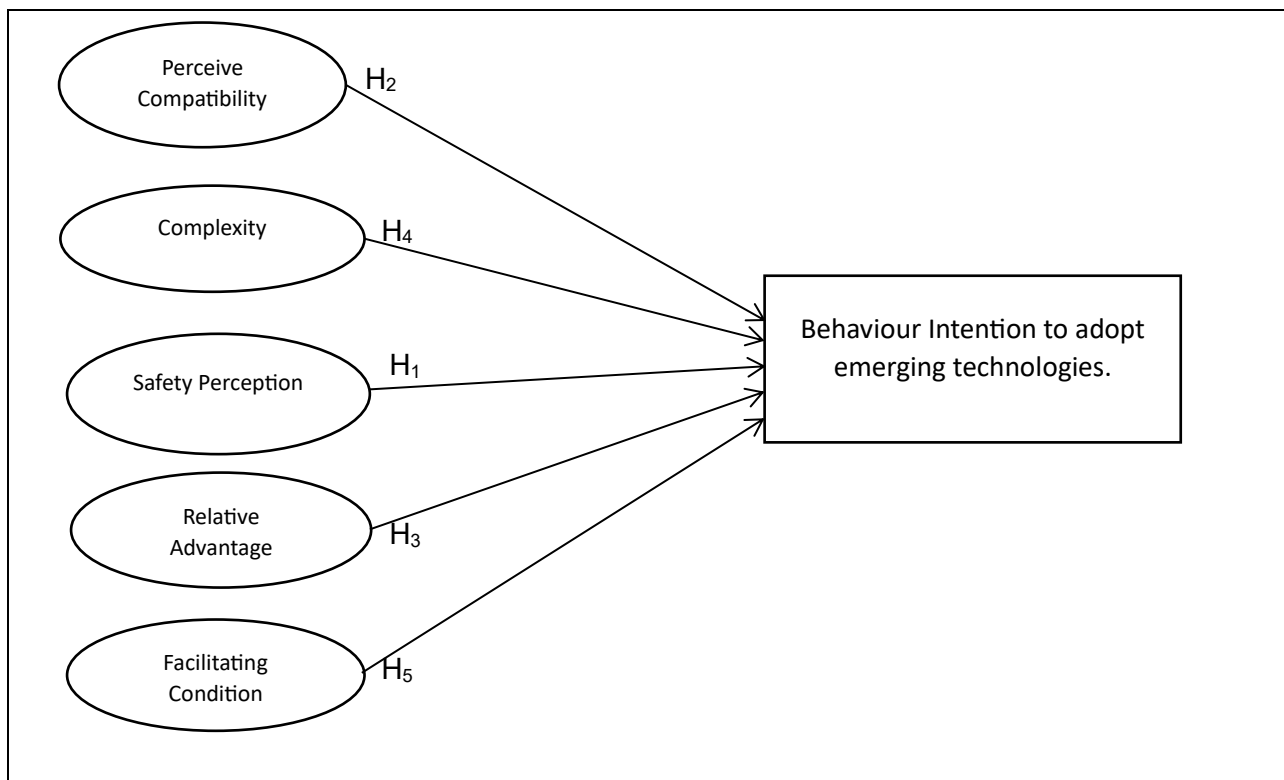


Figure 3- 4: *Proposed Conceptual model (Citizens Perspective)*

The study draws from DOI, TAM, and UTAUT, to propose a conceptual model to understand the individual perspective on rural municipalities integrating emerging technologies into municipalities' service delivery model. Guided by the context of the study such as an increase in information technology/ information systems demand, poor service delivery, current mode of interaction, privacy and security issues, and uncertainties; the researcher proposed a six constructs model comprising facilitating conditions, safety perception, behaviour intention to adopt, relative advantage, and perceived compatibility and observability shown in Figure 3.4. These six constructs are briefly discussed as follows:

Safety perception.

In developing countries, the perception of safety perception towards the internet has been a centre of interest due to individual perceptions of internet-based applications. Merhia, Honea, and Tarhini (2019) suggest that internet-based applications are relatively advantageous as they offer a fast and efficient alternative compared to visiting physical offices for services. However, Merhia et al. (2019) pointed out that more people are still found to be cautious and reluctant to adopt and use internet-based applications, especially in developing countries. Mohammed and Tejay (2017) indicate that high levels of uncertainty and low levels of trust are reasons for individuals' reluctance to use online internet-based applications. However, in their study, Mohammed et al. (2017) discovered a strong relationship between internet safety perception and users' willingness to use online platforms. Balapour, Nikkhah, and Sabherwal

(2020) suggested that security and privacy online concerns are mutually exclusive; thus, perceived safety is built from security and trust. In this study safety perception describes fear of disclosing personal or organisational information, financial information because of cyber-crime and dishonesty.

H1: Citizens' perceived safety will negatively affect their behaviour intentions to use emerging technologies (SP).

Perceived Compatibility.

Human interaction and technologies and their compatibility with reality are the barriers related to technology acceptance. Thus, the attitude and perception of emerging technologies are more likely to increase if technologies are considered more compatible with users' needs (Razmak & Bélanger, 2016). Zabadi (2016) offers a widely accepted definition of compatibility, which was offered by Rogers, who defined compatibility as the degree to which user or organisation believes that using innovation is perceived as consistent with the existing sociocultural values and beliefs, past and present experiences, and needs of potential adopters. The new private sector continuously adopts emerging technologies such as chatbots, mobile payments, social media platforms, artificial intelligence, IoT, and cloud computing. Rogers (1995), defines inline of users' degree of which innovation is consistent with his/her existing value, experience, and needs of service or technology. Driven by the emergence of technologies tools and applications such as chatbots, mobile payment, there is now a huge demand for the municipality to follow the same trend adopted by the private sector. Therefore, in the context of this study, compatibility is described as consistent with users' needs.

H2: Integrating emerging technologies into rural municipality business model is compatible with citizen's and local municipalities needs, thus positively affect behaviour intention to adopt.

Relative Advantage.

The construct relative advantages of emerging technologies have been singled out as a major construct significantly influencing users' behaviour and adoption. In their study, Johnson, Kiser, Washington, and Torres (2017) discovered that relative advantage positively impacts usage intention on mobile payment platforms. Matemba and Li (2018) refers to the relative advantage as a belief that the new technologies will offer more benefits or will be higher than the existing adopted systems. Most of the local municipalities are still adopting the traditional methods of operating and interacting with the local municipalities. In the context of this study, we describe relative advantage as the citizens and local municipalities belief that the use of

emerging technologies in rural local municipalities will bring more benefits to the citizens and municipalities than human based model of service delivery currently adopted.

H3: The benefits associated with emerging technologies influences both citizens and local municipalities behaviour intentions to adopt emerging technologies in rural municipalities. (RA)

Perceived complexity.

Emerging technologies are continuing to be perceived differently by different people (Hui-Wen Chuah, Cheng-Xi Aw, and Yee (2021). Previous scholars such as Adwan, Al-Madadha, and Zvirzdinaite (2018) have indicated that some innovations may be perceived very difficult to understand and use, thus complexity, a construct extracted from DOI. However, Reynolds indicated that, when it comes to complexity, it varies with consumer to consumer. The study by Wang, Yuen, Wong, and Teo (2018) discovered the negative relationship between perceived complexity and attitude toward innovation. Furthermore, even though, there is evidence of inconsistency on the relationship between complexity and intention to adopt and use emerging technologies, the study by Pizam (2022) discovered that there is a significant negative relationship between complexity and intentions to adopt. In this study complexity is aligned difficulties and struggle to use emerging technologies applications, hence the study makes the following proposition/ hypothesis:

H4: Citizens and local government perceived complexity towards emerging technologies will negatively affect their behaviour intentions to use incorporated emerging technologies in municipalities business model

Facilitating Conditions.

The construct facilitating condition was extracted from UTAUT. According to Cao et al. (2021), there is more supporting evidence on the literature that support that facilitating has a significant positive impact on the behaviour intention to use/ or accept emerging technologies, hence they made a proposition that facilitating condition will have a significant positive impact on user behaviour intention. According to Nikou and Economides (2017), facilitating conditions involve everything that supports the implementation of emerging technologies such as organisations resources, users' knowledge, and skills. However, the study by Cao et al. did not establish a significant relationship between facilitating condition and user behaviour intentions (Cao et al, 2021). In the context of this study, facilitating condition is described based on citizens' knowledge, skills and internet connectivity required to support and access the use of emerging technologies such as mobile payment systems, artificial chatbot and self-serving kiosk. Furthermore, in the context of local municipalities, facilitating condition describe the existence

of technological skills, understanding, implementation procedures and policy to successfully implement emerging technologies driven business model.

H5: Lack of supporting facilities will significantly affect both local government and citizens' behaviour intentions to adopt emerging technologies.

3.8 Chapter Summary.

This chapter gave a brief analysis of the most used theories in determining users' adoption into technological innovation. TAM, UTAUT, DTI and TOE construct were discussed and analysed in relation to their relevance to this study. Furthermore, the chapter presented the study's conceptual framework that focuses on individual (citizens perspectives). The model comprised of constructs extracted from the four main theoretical models.

4 CHAPTER FOUR: RESEARCH METHODOLOGY.

4.1 Introduction

This chapter outlines the study research methodology. It covers all procedural elements of conducting scientific research. The chapter illustrates the philosophical stance of the study, research paradigm, approach, design, methods, target population, sampling techniques, data collection techniques, and analysis tools to present the findings. Like Yilmaz (2013), the researcher adopted the four basic questions needed to be addressed before embarking on any educational research: (a) Which paradigm or worldview will inform the study design? (b) Who or what will be studied? (c) Which research strategies will be used? and (d) Which research methods or tools will be used to collect and analyse data? All these issues reflect the study epistemology, theoretical perspective, methodology, and methods, which will be discussed in this chapter.

4.2 The study's philosophical stance

The study's philosophical stance shows the researchers' beliefs in how the research problem can be solved or how the research question can be answered (Cresswell & Cresswell, 2018). The researcher believes the local government business model redefines initiative affiliates to scientific processes such as the dynamic capabilities model theory of planned behaviour. However, in an organisation such as a municipality, this initiative is also determined by individual behaviour, their perception of digital transformations, and the use of advanced ICTs.

Municipalities are democratic spheres in the South African democratic government system designed to link people and the government (Masuku & Jili, 2019). However, what is interesting is that their customers retain equal control over how they want local government to operate and, thus, how they want basic service to be delivered as underpinned by the democratic state. Democratic governments are citizen-centric, meaning that people govern, (Grube, 2013). In this regard, politicians, managers, and civic are all major role players in a local government setup, where the civic is engaged through IDP to sharpen service delivery to the communities, making their business model very different from a private organisation. Based on the complexity of the research scope, the researcher adopted a pragmatic approach to better understand how municipalities can redefine their business model into a technological-driven service delivery model to better the current adopted business model to enhance service delivery to the communities.

4.2.1 The ontology of the study

Municipalities were established to deliver basic services to the people as they are at the lowest end of the three spheres of the South African democratic government. Their business model is more public-centered, and they operate hand in hand with provincial and national governments to improve the living standard of South African citizens by offering basic services (Todes & Turok, 2018). However, some of them struggle to deliver on their mandate due to manual business processes attached to their business model, hence the high number of delays and backlogs. Like the rest of the world, South Africa is moving into an information world, where most tasks are being computerised, and decision-making processes are being improved.

A global increase in internet availability and distribution of computerised devices such as smartphones has been recorded in the past decade, thus triggering innovators to come up with new ideas, new methods, and models of operating. As a result, consumers (both organisations and customers) are starting to change their way of operating. In response to the unstable ecosystem (public, technology, and the environment) in which local government operates, the municipalities need to be able to reconfigure, realign, and possibly reshape their business model to meet the ever-changing environment (Wang & Ahmed, 2007). To achieve this position, the municipality must adopt a high level of competencies, which Teece (2012), pronounced as dynamic capabilities. Organisations need to create specific organisational capabilities (Lou & Bu, 2015), and this will assist the organisations in the processes such as acquiring, aligning, product development, and strategic decision-making for the organization's future and in municipalities to enhance service delivery. In the private sector, dynamic capabilities are considered an integrative approach to understanding new sources of competitive advantage (Teece et al., 1997,) and in the public sector, dynamic capabilities determine the speed at which the organization can align and realign their resources to respond to changes and allow the organisation to combine their assets to improve the customer value creation (Teece, 2012)

There is a direct relationship between changes in the ecosystem in which organisations operate, business models, and dynamic capabilities. Ebel et al. (2016) argue that business models today are receiving attention because of changes in the economic environment, mainly due to continuous technological evolution. Organisations are living entities, meaning they can be impacted by other changes within their ecosystems (Ferguson, 2019). Menon (2008) argues that organisations should develop capabilities to utilise their resources to respond to environmental change. Teece (2014) alludes that dynamic capabilities are an evolutionary fit,

meaning that they present an organisation with an ability to respond to environmental changes such as technological evolution. Organisational routine, core competence, core capability and rigidity, architectural competence, capability building, and absorptive capacity are the tenets of dynamic capabilities an organisation needs (Menon, 2008; Wang & Ahmed, 2007).

Digital transformation in local government cannot be limited to organisational perspective only or scientific processes only, as individual knowledge, experiences, beliefs, perceptions, and environment are also major mediating factors in organisational digitalisation processes. Organisations are composed of people from certain cultural and social groups and may differ in perceptions and beliefs. This has made most qualitative researchers soft relativists because of their flexibility in accepting different realities. Johnson and Onwuegbuzie (2004) indicate that when dealing with human research, soft relativism simply refers to a respect and interest in understanding and depicting individual and social group differences, giving the example of people's different perspectives and a respect for democratic approaches to group opinion and value selection.

This study investigates digital solution initiatives to redefine the South African municipality's service delivery model. Digital transformation and its related processes continue to be received differently across different groups of people, organisations, and cultures, hence still characterised by challenges in some environments. Due to that, the study relied on the strength of quantitative and qualitative research to solve the study research questions by combining the two research approaches.

4.2.2 Epistemology of the study

According to du Plessis and Majam (2010), there is a clear difference between quantitative and qualitative purists on how knowledge should be obtained. They indicated that quantitative purists believe that social observation should be treated as an entity. Thus, social inquiry should be objective, whereas the qualitative purists believe that the knower and known cannot be separated because the subjective "knower" is the only source of reality. Interpretive researchers attempt to understand how others interpret, conceptualise, and understand events, concepts, and categories, as they are assumed to be influencers in individuals' behaviour (Kaplan & Duchon, 1988).

According to du Plessis and Majam (2010), mixed methods can be used to overcome the weakness of each single method by using the strength of each method; in this study, adopting a mixed method enabled the researcher to expand the study by looking at overlapping facets related to the phenomenon as compared to being positivist or constructivist. Ivankova, Creswell, and Stick (2006) indicate that if one approach is believed to be insufficient to solve

the research problem, a mixed-method approach is the way to go. Thus, the researcher believes that digital initiatives to redefine the South African municipality's business model need to be observed holistically by looking at the different components involved; therefore, combining both the elements of positivism and constructivism assisted the researcher in answering the study research questions. Adopting a mixed method approach further allowed the researcher to collect quantitative data about the general perception of the service delivery business model redefining initiatives from citizens. It further allowed the researcher to sample and collect data independently from municipalities' departmental managers on their perceptions and challenges in the adoption of emerging technologies-driven service delivery models.

4.3 The study pragmatism

A research paradigm is a framework that influences how knowledge is studied (Mackenzie & Knipe, 2006). Rahi (2017) offers a rigorous description of the research paradigm, describing it as the collection of beliefs, a set of agreements about how problems are to be understood, how we view the world, and thus go about conducting the research. This was also supported by Byrne and Humble (2007), who indicated that the paradigm reflects the basic belief systems or worldviews of researchers, involving ideas around how knowledge is created and how change can be accomplished or facilitated. According to Goldkuhl (2012), a study can be positivist, interpretive, or pragmatic, whereas positivists are deductive, mainly quantitative, and involve theory testing; on the other side, interpretive are inductive, mainly qualitative, and it involves theory generation.

Research problems can also be major influencers in the adoption of research paradigms. In academic research, some research problems may be too complex to answer and explain in a quantitative or qualitative approach, hence, the pragmatism research paradigm combines both the qualitative and quantitative approaches to form a mixed method. Rahi (2017) suggests that by combining the quantitative and qualitative approaches, the researcher has the advantage of strengthening the quality of the study, which may be impossible to achieve in adopting a quantitative or qualitative approach. The combination of quantitative and qualitative approaches in a single study is dubbed "intersubjective," which simply means being objective and subjective simultaneously (Maarouf, 2019).

The current study matches the interpretation by Maarouf (2019) of the pragmatic paradigm as an intersubjective. The study aims to investigate digital innovative solutions in redefining the South African local government services delivery model with the aim of proposing a digital business model framework for the South African local government. Thus, the study examines

the perception and challenges of adopting a digital-driven service delivery business model. Local government business model initiatives overlap multiple facets such as processes, organisation capabilities, business model innovation, technology acceptance model, individual behaviour, and perception towards the initiative. Therefore, the complexity of the study research problem requires a more pragmatic approach to allow the researcher to look at the initiative from multiple perspectives.

Pragmatism has been accepted in various fields of study, and researchers are now acknowledging the importance of pragmatism in Information Systems research, too (Goldkuhl, 2006). This study aims to answer the main research question: "How do both municipalities and citizens perceive the adoption of emerging technologies in South African municipalities, and what challenges are municipalities facing in digital transformation processes? Transitions into digitalized solutions are intersubjective. Hence, there was a need to broaden the research scope to look at the phenomenon both objectively and subjectively by engaging both citizens and municipalities. As indicated earlier, this initiative affiliates with multiple events, such as business model innovation, digital transformation, capability model, change management, and technology acceptance model. Therefore, the pragmatic approach will provide the researcher with the platform to look at the phenomenon from a municipality's administrative and citizens' perspectives. Moreover, the researcher will be able to triangulate the multiple events that form part of the research interview question and study hypothesis.

Gleelan (2015) outlines three pragmatistic positions that researchers can adopt: multiple paradigms, single paradigms, and a-paradigmatic stances. The pragmatic paradigm puts the research question in the centre and applies all approaches. This means that the research questions control data collection and data analysis. This study adopted a pragmatic research paradigm, a single paradigmatic position for mixed-method research encompassing both qualitative and quantitative research methods. Goldkuhl (2006) further indicates that there are three types of pragmatism in Information System research which are functional, referential, and methodological pragmatism.

The contrast between the three types of pragmatism in Information Systems is that with functional pragmatism, knowledge is seen to improve the world; referential knowledge is formulated in terms of action; and methodological knowledge is obtained through actions. Underpinned by the purpose of the study, which aims to propose a smart digitalized local government business model, the study follows functional pragmatism as the findings will provide a better route to allow the interlink between emerging technological features and local government activities to improve their operation.

4.3.1 Pragmatic paradigm in Information Systems research

Goldkuhl et al. (2006) outline the foundation of pragmatism in Information Systems research in which the following simple pragmatist questions should be asked: "Who is the actor? What action is to be performed? What is the result of the action? The alignment of the study as a functional pragmatism associated with the three questions addressed by Goldkuhl (2006) emanates from the purpose of the study.

According to Marshall, Kelder, Perry, and Tasmania (2005), the Information Systems discipline is concerned with identifying, planning, developing, implementing, and managing information systems in organisations. Hence, the organisation as a reality is most important in Information Systems research. However, we should not be limited to organisational reality as today Information Systems is a strategic factor that most organisations are considering, making it very difficult to separate the two. Thus, it should be looked at as Organisation Information Systems as a reality. According to Tompson (2017), studies in advanced technologies such as smart cities and management were criticised as having narrow epistemology, and their shortcoming was a failure to translate findings into a real-life solution. This means that most Information Systems studies were either positivist or interpretive, and their findings were proving difficult to implement as they were single-angled. This led to the introduction of pragmatism in the field of IS and management, which aimed to solve those shortcomings to broaden the scope and include all the important facets.

Studies focusing on government information digital transformation are mostly narrowly focused on the organisational perspective, thus overlooking societal and political perspectives. This study breaks the boundaries of previous studies by looking at municipalities' business model transformation by including citizens as the beneficiaries of municipalities' digital initiatives. Kaplan and Duchon (1988) indicate that the interpretation of information technology in terms of social action and meanings is becoming more popular. This suggests that information systems development and use incorporate social and technical process elements and cannot be detached from social and organisational needs. This means that the organisation's information systems should be societal-focused and aim to solve a societal or organisational problem; this is aligned with the purpose of this study. Information Systems should not be detached from society. Hence, the local government business model redefining initiative cannot only affiliate with the organisation.

According to Goldkuhl (2006), the foundation of pragmatics is human knowledge and actions that might be taken. This means that by combining human knowledge, experiences, and scientific processes, information systems research will become more action-oriented to solve

a practical, real-life problem (Maarouf,2019)). Goldkuhl (2006) raised a very important aspect of pragmatism approaches by suggesting that human belief, attitude, or perception towards a certain concept, trend, or situation guides actions to be taken. This means that how role players within local government perceive emerging technologies determines organisational responses towards them.

4.4 Methodology

According to Vogt, Gardner, and Haeffele (2012), a research design is defined as the logic or master research plan that throws light on how the study must be conducted. It shows how all the major parts of the research study work together to address the study research questions. A research design is not just a work plan, as it details the work that needs to be done and how it should be done to complete the research project. Without attending to a clear research design at the beginning, the drawn conclusion will normally be weak and unconvincing and fail to answer the research question (Bryant, 2017).

The relationship between business models and digital transformation has been a growing trend, with many studies focusing on this relationship from the private sector perspective, with little attention paid to the public sector, especially in rural communities. Emerging technologies are drivers of business model innovation in most industries, leading organisations to reshape and redefine their business model in response to the ecosystem in which they operate, to enhance service delivery to their customers.

The study adopted an explanatory case study research design taking a local government service delivery business model and redefining initiative as a unit of analysis, which Crowe, Cresswell, Robertson, Huby, Avery, and Sheikh (2011) define as a research approach that is used to generate an in-depth, multi-faceted understanding of a complex issue in its real-life context.

According to Baxter and Jack (2008), a researcher should consider adopting a case study design when one of the following is met: (a) the focus of the study is to answer "how" and "why" questions; (b) you cannot manipulate the behaviour of those involved in the study; (c) you want to cover contextual conditions because you believe they are relevant to the phenomenon under study; or (d) the boundaries are not clear between the phenomenon and context. The current study meets all the possible considerations of adopting a case study as it seeks to understand how both citizens and municipal officials perceive emerging technologies-driven digital transformation initiative. The behaviour and perception of participants towards the local government business model redefining initiative that cannot be influenced as they largely depend on individual experience and knowledge.

4.5 Research Approach

Based on the nature of the research problem, the issue being addressed, the researcher's personal experience, and the audience, the researcher needs to decide to choose from three approaches (quantitative, qualitative, or mixed method), which, according to Creswell and Creswell(2018) , is plans or procedure which spans the key elements of research such as philosophical assumption, data collection processes, data analysis, and interpretation. Quantitative research is objective and aims to test a theory, and on the other side, qualitative research is more subjective and aims to explore and provide more details on the phenomenon being studied, and it is generally employed to support a researcher in generating a deep understanding of a given phenomenon (Lester et al., 2020). Furthermore, Dworkin (2012) stated that qualitative research is often centred on the how and why of an issue, process, situation, subculture, scene, or set of social interactions.

However, a mixed-method approach was born due to the complexity of other research problems, which are impossible to be solve by adopting a single-strand approach. According to Creswell and Creswell, the mixed method resides between quantitative and qualitative research approaches as it incorporates the elements of both quantitative and qualitative approaches. Creswell and Zhang (2009) indicate that, for the study to be a mixed method, it should involve collecting and analysing both quantitative and qualitative data.

Creswell and Zhang (2009) define mixed methods as a research procedure involving the collection, analysis, and integration of both quantitative and qualitative data to answer research questions. Kaplan and Dochun (1988) suggest that combining qualitative and quantitative research methods enables researchers to introduce testability and context into the research by collecting different kinds of data through different methods from different sources, providing a wider range of coverage that may result in a fuller picture of the unit under study than would have been achieved otherwise. Furthermore, by combining qualitative and quantitative research methods, the researchers can explore more complex issues and relationships between the human and social world (Malina et al., 2011).

The study seeks to investigate the municipality service delivery business model redefining initiative by looking at the citizens, and departmental managers' perceptions and challenges municipalities are facing in the adoption of emerging technologies. The mixed method approach allowed the researcher to adopt both qualitative and quantitative research approaches and further collect data from different groups of participants. According to Bryman, 2006, there should be a clear justification for adopting a mixed-method approach, and there are multiple rationales given in the past as justification towards the adoption of a mixed-

method research approach. In this study, the researcher intended to understand digital transformation initiative to define rural local municipalities business model, by examining both citizens and local municipalities perception towards emerging technology driven business model. Furthermore, the study investigates the challenges local municipalities are facing in their expeditions to re-define their business model by incorporating emerging technologies and how best South African rural local municipalities can digitally transform. The nature of local municipalities in South Africa, requires a holistic approach towards digital transformation initiatives in by considering both citizens (external) and municipalities (internal) perspectives. Therefore, by adopting mixed method approach, the researcher was able to have a complete view towards digital transformation initiatives in rural local municipalities. Mixed method enabled the researcher to understand individual and organisation perception towards the integration of emerging technologies in rural municipality service delivery model. This is in line with one of the rationales given by previous scholars as indicated by Bryman, 2006, that a mixed method can be adopted to assist the researcher in getting a more comprehensive account of the area of enquiry in which he or she is interested on.

4.6 Research Design

Within the selected approach, the researcher also needs to select the study strategic inquiry, a strategy the researcher will adopt to solve the research problem (Cresswell & Cresswell, 2018). The study approach also determines the strategic inquiry of the study. Thus, there is a clear relationship between the study approach and research design. This study adopted a convergent parallel/ concurrent mixed method design, to enable researcher to obtain different but complementary data to answer to how citizens and rural local government perceive reddening of local municipalities service delivery model by incorporating emerging technologies to their business processes as indicated by Halcomb & Hickman, 2015. The convergent parallel mixed method design, the researcher collected and analysed quantitative and qualitative data independently from each other. However, the two different data sets were integrated on the discussion stage of the study. Further details on integration are provided in this study on the triangulation section.

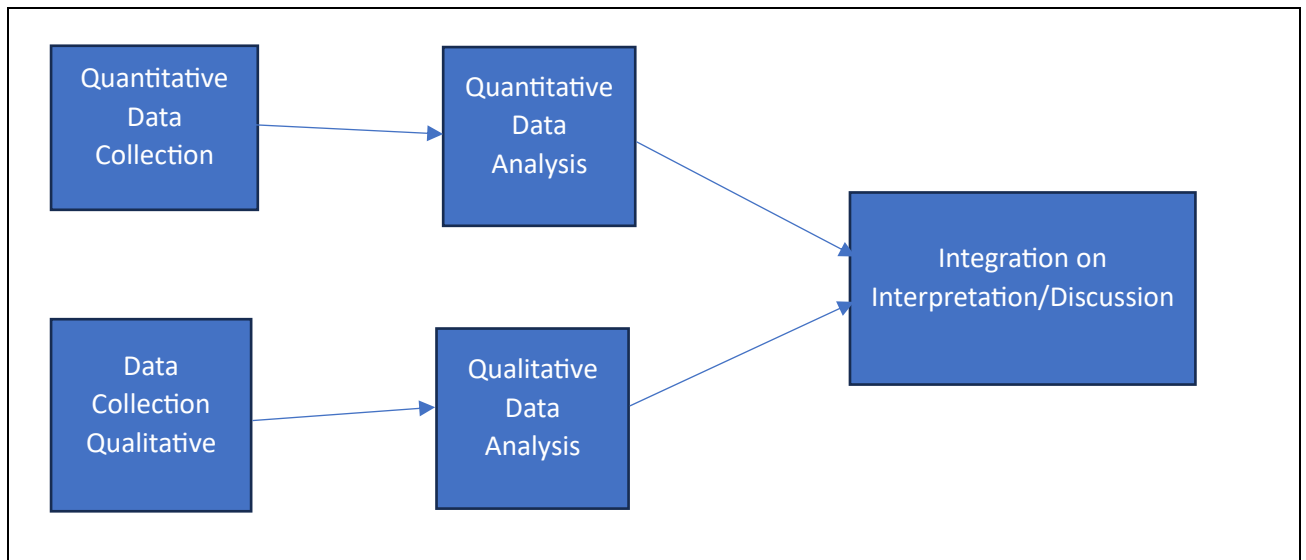


Figure 4- 1: Convergence Mixed Method Topology

4.7 Target Population of the Study.

According to Cox (2011), the target population for a study is the entire set of units for which the survey data are to be used to make inferences. Thus, the target population defines those units for which the survey findings are meant to be generalised (Garson, 2012). Target populations must be specifically defined, the geographic and temporal characteristics of the target population must be described, and the types of units being included.

4.7.1 Target Population for the Quantitative strand

However, in contrast, quantitative methods tend to employ probability sampling to maximise power and meet the assumptions of analytic strategies. This study targets rural local government located in an area formally known as homelands in South Africa, categorised as B and C by the South Africa Yearbook 2018/19. In the quantitative method, the study targeted the citizens around those areas formally known as homelands to get their perception towards redefining the local government business model into a smart service delivery model.

4.7.2 Target Population for the Qualitative strand

According to Lieber (2009), qualitative methods are more focused on generally smaller samples and tend to employ purposive sampling strategies, which Etikan, Musa, and Alkassim (2016) describe as a sampling technique the researcher will deliberately choose a participant from due to the qualities the participant possesses. Most importantly, Etikan et Al. (2016) indicate that this non-probability sampling technique does not need an underlying theory or a set number of participants.

According to Scheepers (2015), the Constitution of South Africa provides for three categories of municipality, and there are 278 municipalities in South Africa, comprising eight metropolitans which falls category A, 226 local municipalities which falls under Category B, and 44 district municipalities categorised as A. All these municipalities are focused on growing local economies and providing infrastructure and service. Limpopo and Mpumalanga provinces are more constituted by rural communities, making them more qualified for this study; metropolitans are excluded from the study due to their advances in digital transformation stages and in adopting and using emerging technologies. The researchers targeted rural municipality departmental managers in this study to get their understanding of the integration of advanced technologies such as AI and IoT in the business model based on their knowledge and experiences on how local government and advanced technologies can successfully incorporate their activities and advanced technologies.

4.8 Sampling and sample size

Taherdoost (2016) points out that it is doubtful that a researcher may collect data from the entire population to successfully answer the research questions, and this is because of cost, convenience, and time. Hence, it is one common procedure for each researcher to select a sample, which Etikan et al. (2016) describe as a portion of a population or universe. This is a technique (procedure or device) employed by a researcher to systematically select a relatively smaller number of representative items or individuals (a subset) from a pre-defined population to serve as subjects (data source) for observation or experimentation as per the objectives of his or her study. Oppong (2013) gave a broader description of sampling by describing it as a process of selecting subjects to participate in a research investigation because it provides relevant information to the research problem.

In most academic studies or research, the opportunity to study the entire population is an attempt that most researchers do not have the time and other resources to undertake (Latham, 2007). This was also supported by Taherdoost (2016), who claims that researchers have neither the time nor the resources to analyse the entire population, so they apply a sampling technique to get a representative subset of the entire population. In quantitative research, the researchers rely upon statistical methods to obtain a representative sample size from the population under study. On the other hand, the sample size in qualitative research is obtained on the saturation of information. Lastly, for the mixed method, the minimum sample size required for qualitative and quantitative research is decided on (Kaur et al., 2019). In mixed-method research, sampling largely depends on the research design adopted (Radhakrishnan, 2014). Collins, Anthony, Onwuegbuzie, and Jiao (2007) mention that in mixed method, consideration of sampling scheme and sample size should be made for both quantitative and

qualitative phases, where a sampling scheme represents the strategy to be used to select the study units. The sample size is the selected number of units to be studied.

4.8.1 Sampling for the Qualitative Strand

A homogeneous purposeful sampling method was adopted to collect data from the local government's top managers. According to Etikan et al. (2016), homogeneous sampling allows the researcher to focus on candidates who share similar traits or specific characteristics, and this can be in terms of age, culture, job, or life experience. For this study, homogeneity comes from heading one of the municipality's functional departments. Furthermore, Etikan et al. (2016) indicate that a purposive sample involves the identification and selection of individuals or groups of individuals who are proficient and well-informed about a phenomenon of interest. In addition, the choice of participants is not only limited to knowledge and experience but also depends on the availability and willingness to participate and the ability to communicate experiences and opinions in an articulate, expressive, and reflective manner.

Teherdoost (2016) also indicates that purposive sampling, also refers to as judgmental sampling, is a strategy in which participants are selected deliberately to provide important information that cannot be obtained from other choices. In this technique, the researcher included the participants in the sample because the researcher believed that participants warrant inclusion. This means that there should be clear, predefined criteria participants should meet to participate in the study, hence Etikan. Al (2016) indicates that the idea is to concentrate on the people with certain characteristics. In this study, the criteria are that the participants should be on the local government's top management level and be knowledgeable about local government responsibilities and the currently adopted business model.

Purposive sampling is an example of a non-probability sampling technique, and according to Luborsky and Rubinstein (1995), it is a practice where subjects are intentionally selected to represent some explicit predefined traits or conditions. In this study, the phenomenon of interest is the initiative to redefine the traditional municipality government service delivery business model, an emerging technology-driven service delivery model mainly focusing on their perception and challenges.

According to Peterson (2019), all studies need enough participants to capture distinctions in how a phenomenon is experienced. However, Hunt, Johnston, Browne, and Zhang (2011) argue that, instead of sample size, the focus on manuscripts should be on how and why participants were selected. Hence, Langham (2001), in his stance, states that calculating the most appropriate sample size is an important step in the research process, notably in quantitative studies. However, the sample sizes of studies differ from the epistemological view

of the study. Creswell (2013) notes in the wide-ranging numbers of published studies that qualitative studies are more focused on the depth and detail of the study, not a generalisation. In this study, a total of 7 participants were interviewed before reviewing data for saturation and satisfaction. This follows the guideline by Creswell of 4 to 5 participants in case-study research and 20 to 30 in a grounded-theory study. In the current study, the number of interviewees were fixed; however, the data collection would stop once the saturation point was reached as indicated by Oppong (2013) a sample size may change during the data collection process.

4.8.2 Sampling for the Quantitative Strand

Probability sampling is useful for generalizing results to the study population. It involves a random process (Acharya et al., 2013). With probability sampling, every member of the population has an equal chance to be selected. A multistage sampling technique was adopted to obtain the study's quantitative data. According to Collins, Onwuegbuzie, and Jiao (2007), multistage sampling is a probability sampling that allows the researcher to choose a sample by conducting a simple random sampling method at different stages, and it is more suitable in a situation where a study population has multiple levels of units that are embedded to each other. Further, the multistage sampling technique is based on the natural cluster of the population (Sedgwick, 2015), such as provinces or districts.

According to Acharya et al. (2013), in a typical multistage sample technique, the cluster gets smaller and smaller in each stage, and in the final stage, subject sampling is conducted. They further gave an example like the study situation where "*In a national survey, a random number of districts are chosen in all the states followed by a random number of talukas and villages. In the third stage, houses will be selected. All the houses which are the final units of sampling are surveyed*". They adopted a similar approach by first randomly selecting provinces, followed by districts, local municipalities, villages, and households in the selected village.

Furthermore, Taherdoost (2017) points to sample size as a significant feature of any empirical study aiming to deduce the population. This is also critical for generalising study findings and avoiding sampling error. The quality of study findings depends largely on the way researchers select the sample size. Oppong (2013) indicates that the researcher needs to select an adequate sample size to avoid invalidating study results. The researcher needs to obtain an accurate sample size to ensure the quality of study findings.

However, it is not always easy to draw a sample size as it depends on the kind of study one is undertaking and the characteristics of the study population. It is important to ensure that the sample size for one's study as a researcher is adequate as well as representative. The quality of the study and findings can be validated by drawing from a sufficient sample size of the total

population, and this can be verified by having a method or formula to calculate the size of the sampling error. Across all nine provinces of South Africa, there are 202 local municipalities as of 2021.

4.8.2.1 Multistage quantitative sampling

According to Mian (1969), multistage sampling is a sampling that is done in stages, where a larger previous or initial stage is subsampled into a small and manageable sample size. For sampling to be multistage, it should constitute multiple sampling stages (probability), which allow the researcher to concentrate resources on the limited area of the target population. Furthermore, this technique allows the researcher to group the target population in their natural settings, such as districts, municipality demarcations, wards, villages, and people (Sedgwick, 2015). In the initial stage, the researcher randomly selected three districts, one in Mpumalanga (Ehlanzeni) and two in Limpopo (Capricorn and Vhembe). The second stage involved the random selection of municipalities: one under Ehlanzeni, one in Capricorn (Lepelle Nkumpi), and three in Vhembe District. The final stage involved the selection of households. Table 4.1 represents the number of municipalities and district municipalities across South Africa.

Table 4.1: List of Provinces, Districts and Municipalities

Provinces	Districts	Municipalities
Western Cape	5	24
Eastern Cape	6	31
KwaZulu Natal	10	43
Northwest	4	18
Gauteng	2	6
Limpopo	5	22
Free state	4	16
Mpumalanga	3	17
Northern Cape	5	25

Table 4.2 shows the population distribution between the selected Municipalities in Ehlanzeni (Bushbuckridge), Capricorn (Lepelle Nkumpi), and Vhembe District (Musina, Collins Chabane and Thulamela), as extracted from the municipality IDP 2022/2023 documents.

Table 4.2: Selected Municipalities

Municipalities	Estimated number of households
Lepelle Nkumpi	61035
Thulamela	130321
Bushbuckridge	137000
Collins Chabane	91936
Musina	132009

For the quantitative strand of the study, the researcher adopted a multistage sampling technique which comprised on multiple phases of sampling. A simple random technique was adopted to identify the primary unit of analysis (households), therefore the researcher relied on the Krejcie and Morgan Table to determine the sample size of 382. According to Rahman, 2023, for a social and behavioural study a researcher may not use any form of calculation but depend on a predetermine sampling methods such as Krejcie and Morgan Table. Based on the Krejcie and Morgan Table, a population between 75000 and <1000000, a sample size of 382 is sufficient. Previous study by Wei, Abdullah & Nordin, 2022 on the cognition of the use of technology in ESL classrooms adopted the same technique on determining the study sample size.

4.9 Data Collection

Data collection refers to the process by which the researcher collects relevant data required to answer the research questions or problems (Awaisu et al., 2019). The study approach largely influences the process of collecting data for research. Guided by the mixed method research approach adopted in this study, the data collection process was conducted in two independent phases concurrently.

4.9.1 Quantitative data collection.

Quantitative research is positivist, with an ontological position that there is only one truth, and that reality is independent of human perception (Sale and Brazil, 2004). Kaur (2016) further indicates that quantitative research considers that society or the world operates according to general laws. To collect the study's quantitative data, the study adopted a questionnaire, which, according to Abawi (2013), is a data collection instrument that consists of a series of questions generated to gather information from respondents (Abawi, 2013). According to Bird (2009), a questionnaire is a well-established tool within social science research and very suitable for acquiring information about participant's social characteristics, their present and past behaviour, standards of behaviour or attitudes, and their beliefs and reasons for action

concerning the topic under investigation, and further allow respondents to be asked to report about themselves, others, or entities. This suits this study as the researcher aimed to understand how citizens in rural municipalities perceive the adoption of emerging technologies in municipalities' business models.

4.9.2 Quantitative instrument development process and evaluation.

To gather useful and relevant information about citizens perception towards adoption of emerging technologies in local municipalities, the researcher adopted a step-by-step questionnaire development process mentioned by Patel & Josephs, 2016. The researcher relied on the literature, colleagues and supervisors' expertise to align the study instrument with the concept of digital transformation in local municipalities what it intends to measure. The next step involves determining an appropriate response structure. Close ended questions in a form multiple choice and Likert scale questionnaire were found to be appropriate for this study. The next step involves re-read and rephrase of wording to reduce jargon wording.

A sections-based sequence was adopted. The self-administered questionnaires consisted of three sections were distributed randomly in a mixture of hard copies and soft copies to the selected households. Section A required participants' demographic information. This includes age, gender, internet accessibility, and digital competencies. Section B required participants to report on the current model they are adopting and using to interact with municipalities. Section C consisted of Likert scale questions on the citizen's perception towards the adoption of emerging technologies in municipalities, with five possible options on the scale ranging from strongly disagree to strongly agree.

4.9.3 Strategies to manage non-response.

According to Rogelberg & Stanton, 2007, non-response rate and non-response bias are concerns for every researcher who conduct, analyse and interpret study results, as they can produce misleading results. In their study (Rogelberg & Stanton, 2007, outlined multiple response facilitating techniques such as pre-notifying participants, publicizing the survey and carefully designing. However, due to the nature of the study some of these approaches were not applicable such as publicizing the survey and incentivising the participants. For this study to manage nonresponse and responsive bias, the research relied on the few approaches listed by Rogelberg & Stanton, 2007 in their study. The researcher made sure that the data collection tool was carefully designed which was enhanced through piloting study results. Furthermore, the researchers included the purpose of the study and importance of participating in the study on the data collection tool. Wording on the data collection tool was clear and precise to avoid minimising time to complete the data collection tool.

4.9.4 Qualitative data collection phase

The complexity of the study research problem may require the researchers to overlap and further look at other facets of the phenomenon under study. Therefore, to better understand the municipality's perception and challenges towards emerging technologies, the interviews were conducted with departmental managers in rural municipalities. For better insights into individual knowledge and experience, a data collection tool that is flexible and sensitive to the social context is required. Therefore, the study adopted an interview as a data collection tool for the second phase of data collection, which is known to be a common data collection method for the purposively selected participants.

Adopting a mixed method allowed the researcher to qualitatively examine how departmental managers perceive the incorporation of emerging technologies in the municipality service delivery business model. According to Vishnevsky and Beanlands (2004), qualitative researchers often gather subjective data that include both thoughts and perceptions towards the phenomenon under study; hence, open-ended questions (main and follow-up) were asked of the participants. Very often, researchers in qualitative research believe that people have different perceptions and behave differently, influenced by their intelligence and understanding of the phenomenon.

One advantage of collecting data through interviews is that researchers can explore in-depth human insights and perceptions of complex social phenomena (Peng et al., 2011). Emerging technologies are associated with different perceptions in different groups, individuals, or organisations. Therefore, depending on how one individual perceives it, a deep interview was required to understand this initiative in the context of South African municipalities.

4.9.5 Recruitment procedure and Interview set-up.

For this study multiple procedures were adopted to recruit departmental managers in local municipalities to participate. This include visiting local municipalities, via emails and telephone call where email addresses and telephone numbers obtained from local government websites. However, the main method adopted for this study was via emails. The researcher sent multiple emails to different municipalities detailing personal details, the purpose of the study and attachments which includes ethical clearance letter and interview guidelines when requested.

Arrangements for face-to face interviews were made via emails and telephone calls, thus interviews were made in departmental heads offices in local municipalities premises. Before the start of semi-structured interviews adopted in this study, all the participants were briefed

about the study and what it intends to achieve, and most importantly, participants consent to record the interviews were obtained before the commencement of all interviews.

4.10 Data Quality Control

Reliability and validity are very critical components of research in enhancing the accuracy of the assessment and evaluation of research work (Kimberlin & Winterstein, 2008). If a study does not establish validity and reliability, a very vital feature of research, it cannot yield beneficial results. Golafshani (2003) suggests that quantitative research strives to present valid and reliable research findings that could be replicated and generalised. Reliability refers to the consistency of a measure. According to Rolfe (2014), the validity and reliability of the study are achieved when the researcher rigorously follows several verification strategies during the research process. This means that the quality of the study is largely determined by the quality processes involved in a study, such as data collection and analysis.

4.10.1 Quantitative data quality control

For the study to attain beneficial or quality results, the adopted instrument should be of certain qualities. In quantitative research, a research instrument or test result is considered reliable if the same result is obtained repeatedly when the instrument is re-administered or tested under the same circumstances using the same measuring instrument.

4.10.1.1 Reliability

Reliability can be estimated in two-way Test/Retest Test and Internal Consistency. Test/ Retest Test is the more conservative method to estimate reliability. Simply put, the idea behind test/retest is that you should get the same score on test 1 as on test 2. Reliability analysis was tested using Cronbach's Alpha to measure the reliability of the constructed variable of the questionnaire.

4.10.1.2 Validity

Several researchers, such as Hammersley (1987), Sürücü, and Maslakçı (2020) indicate that validity represents the extent to which an instrument measures the property it is intended to measure. Validity is the extent to which a concept is accurately measured in a quantitative study. According to Brown (2000), a general concept of validity was traditionally defined as "the degree to which a test measures what it claims, or purports, to be measuring. Twycross and Heale (2015) and Sürücü and Maslakçı (2020) indicate that several measures of validity provide evidence of the quality of a study. Internal and external validity relates to the overall study design. Internal validity relates to the extent to which the design of a research study is

appropriate for the research questions. Sürücü and Maslakçı (2020) indicate the large continuum of types of validities; however, according to them, content and construct validity are mainly important, though all are important depending on the purpose of the study.

Bollen (1989) defines content validity as a qualitative form of validity that evaluates whether the expressions contained in the measuring instrument represent the phenomenon intended to be measured. In addition, Wynd, Schmidt, and Schaefer (2003) define the extent to which an instrument adequately samples the research domain of interest when attempting to measure phenomena. They further indicate that to ensure that the research instrument is valid, the following two steps in a process need to be followed: identifying the entire domain of content related to the phenomena of interest, beginning with a thorough review of literature, and developing an instrument item associated with the identified domain of content. This means that the route to a valid research instrument tool for academic research is a designed literature review. Without clearing your research domain as a researcher, it may be difficult to develop a valid research instrument. However, with no clear criteria for determining the research instrument validity, the test is solely left to the researcher's judgment, logic, and reasoning with validation from a panel of judges holding expertise in the domain of content.

By looking at the aim of the study, two domains are involved: the information systems domain and the local government domain. Therefore, the panel of experts cannot be limited to one domain as it may affect the validity of data and the validity of an instrument. The research literature should attempt to create a link between the information systems domain and local government. Therefore, in the research instrument, the items included should be aligned with the digital transformation initiative in local government as a phenomenon and should incorporate both internal and external perspectives towards digital transformation initiative, hence two concurrent data collection phases were established.

To test if the questionnaire developed aligns with the incorporation of information systems into business models in South Africa's local government, the research relied on the opinion of the experts at the University of Venda in the Business Information Systems Department and Public Administration Department. A Likert-type ordinal scale with four possible responses was used to achieve this. As indicated by Wynd et al., the responses include a rating of 1 = not relevant, 2 = somewhat relevant, 3 = quite relevant, and 4 = very relevant, where ratings of 1 and 2 were considered "content invalid." In contrast, ratings of 3 and 4 were "content valid."

The researcher adopted the formula introduced by Lawshe (1975) to test the content validity of the study questionnaire. According to Lawshe, evaluating content validity through experts' opinions is a form of statistical analysis based on the content validity of whether the items in the measuring instrument should be on the scale or not.

4.10.1.3 Construct validity.

Colliver, Conlee, and Verhulst (2012) indicate that Cronbach and Meehl introduced the construct validity in the mid-1950s to address the validity of those many psychological concepts with no clear referent. However, Brown (2000) suggests that to understand the traditional definition of construct validity, it is first necessary to understand what a construct is. According to him, a construct or psychological construct, as it is also called, is an attribute, proficiency, ability, or skill that happens in the human brain and is defined by established theories. Construct validity is considered a unifier as it contains both the aspects of two common types of validity: content and criterion validity.

In this study, the issue of construct validity emanates from the study's conceptual framework. The study's proposed framework includes the number of constructs or attributes connected to a form of the nomological network, which, according to Colliver et al., (2012), is a network of laws that relates constructs. Bagozzi, Yi, and Phillips (1991) identify the different measures of techniques that can be used to validate the construct of the study, such as content analysis, correlation coefficients, factor analysis, AVE (average variance extracted), ANOVA studies demonstrating differences between differential groups or pretest-post-test intervention studies, factor analysis, multi-trait/multi-method studies. However, for this study, the average variance extracted was used to test the convergence validity of the multiple study constructs.

4.11 Pilot Study

Conducting a trial run or a feasibility study is a very good practice in social sciences research. This is called a pilot study, which is essential in pre-testing the research instrument by allowing the researcher to identify the errors and undesirable trends that might be in the questionnaire, and it helps better the design of the questionnaire (Mathiyazhagan & Nandan, 2010). Furthermore, a pilot study is an investigative tool to test the feasibility of instruments and procedures and collect information before a main study (Hertzog, 2008).

The questionnaire was pilot tested before it was finally distributed for data collection. According to Teijlingen and Hundley (2001), one of the advantages of conducting a pilot study is that it gives the researcher a warning about where the main research project could fail, where research protocols may not be followed, or whether proposed methods or instruments are inappropriate or too complicated. A pilot test was conducted at the Thulamela local government and one selected village around Thohoyandou by distributing twenty (20) questionnaires to the randomly selected qualified households or individuals. The results of the

pilot study assisted the researcher in making an adjustment to the data collection instrument before a full-swing data collection.

4.12 Factor analysis and structural equations modelling process.

This study took advantage of a built-in tool on the SPSS, a commercial statistical package and AMOS, for explanatory factor analysis, confirmatory factor analysis and structured equation modelling. To access the exploratory analysis function of SPSS, the researcher clicked the following options: Analyze > Dimension Reduction > Factor. To start the process, 26 variables were move from the left-hand box to the right-hand Variables box. To conduct the explanatory factor analysis the following steps were suggested by Yong & Pearce, 2013. Step 1: Descriptives. KMO and Bartlett's test of Sphericity was ticked. Step 2: Extraction. The eigenvalue was set at 1; Step 3: Rotation. Rotated Solution (auto ticked) and Loading plot(s) were ticked. Step 4: Factors score and options -Anderson-Rubin method by selecting Save as variables. Step 5: Options which involves selecting missing values option and the coefficient display format and Exclude cases listwise.

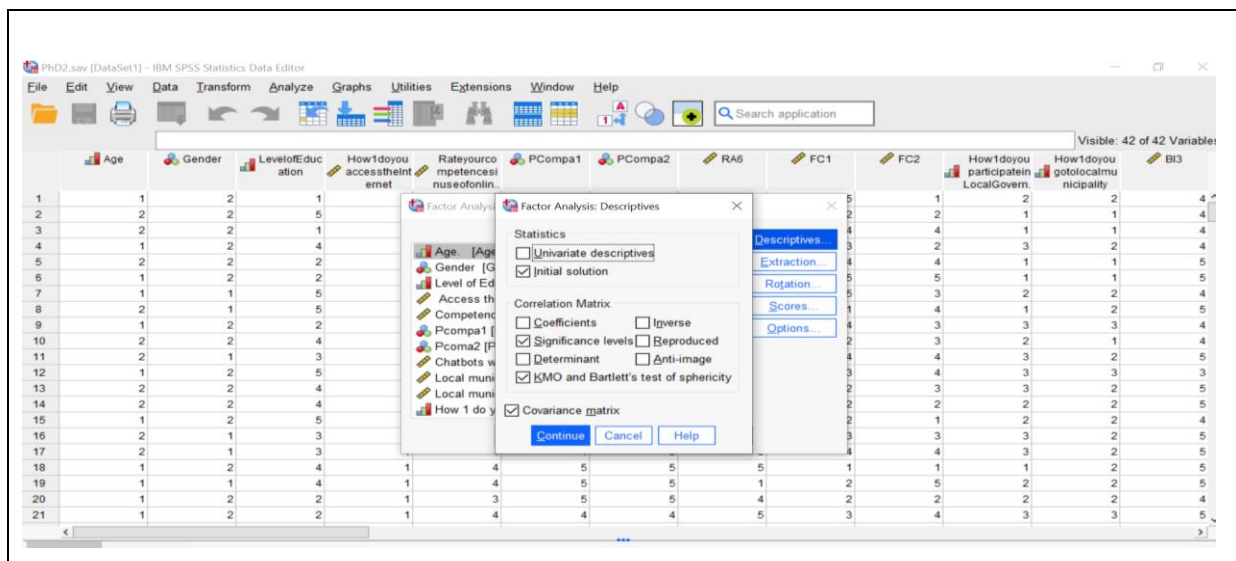


Figure 4- 2: Illustration of study explanatory factor analysis process: extracted from study quantitative data set.

4.12.1 Confirmatory factor analysis and Structured Equation Model development process.

To confirm the model, confirmatory factor analysis was performed using IBM AMOS. The following steps were taken Selection of data file; building and naming latent variables guided by constructs on the conceptual framework, hypothesis and research questions the study intends to test and get answers on; selection of standardized estimates and modification indices; Saving project name and Run; Model fit assessment (updating); and lasty Reporting and Visualisation.

4.12.2 Qualitative data quality control

4.12.2.1 Trustworthiness

Trustworthiness has become a matter where a researcher is viewed as having made the research practices visible and auditable, and the study is trustworthy if the reader judges it so. Gunawan (2015). Qualitative studies adopt trustworthiness to test the study reliability and validity of the results obtained, and to achieve that, Lincon, and Guba (1985) identify four criteria to test the trustworthiness of the qualitative data: credibility, transferability, dependability, and confirmability. According to Anney (2014), credibility ensures that the study results represent the participants' views. To establish study credibility, which is equivalent to validity in quantitative studies, the researcher adopted peer checking, as suggested by Gunawan (2015) as one of the techniques a researcher can adopt to establish study credibility. The researcher relied on the colleague's experience to ensure that qualitative data was correctly analysed. Another feature to test or judge the qualitative study is confirmability or dependability, and according to Byrne (2001), this can be achieved by keeping an audit trail of the steps taken in the study. In this study, the researcher will keep all required documents, including original data and communication with participants, to allow the independent examiner to track and audit all the steps taken in this study.

4.13 Data Analysis

Data analysis is a process of inspecting, cleaning, transforming, and modelling data to discover useful information, suggest conclusions, and support decision-making. A mixed method approach supports quantitative and qualitative collection, hence two separate databases (quantitative and qualitative datasets).

4.13.1 Quantitative data analysis

Quantitative research makes use of questionnaires, surveys, and experiments to gather data that is revised and tabulated in numbers, which allows the data to be characterised using statistical analysis. The study adopted a mixed methods approach, combining both positivist and interpretative; therefore, for positivist, the study adopted the latest version of IBM Statistical Package for the Social Sciences (SPSS) version 29.0.0.0 due to its strength in performing both descriptive and advanced statistics (Correlation, Anova and Regression test). In addition, the latest version of IBM AMOS, version 28.0.0.0, was used to perform confirmatory factor analysis and SEM (structural equation model) to refine and establish the model fitness.

4.14 Procedures for dealing with Missing data Value Analysis and Outliers.

In practice, it is very common for collected dataset to contain some incomplete variables, and this maybe because of various reasons ranging from entry mistake to participant not

responding to the question (Lin and Tsai, 2019). In addition, Guan, and Yussof (2011) indicate that missing data may affect the precision and validity of the study results and should not be made up, but analysis should be made on the complete dataset. On the other hand, outliers are also extreme values that may affect the validity of the study, and it is also significant for researchers to properly handle the outlier before data analysis (Mowbray et al, 2019)

This study adopted the amputation technique to manage missing data or outliers on a data set. Lin, and Tsai (2019) indicate that in a data set, a percentage of less than 10 or 15 can be deleted and not affect the final analysis results. For this study, 322 entries were made, and the conducted missing data and outlier detection (histogram) analysis reveals that 34 (10,6%) questionnaires had either one or more missing values. Based on the recommendations by Lin et al, a listwise deletion technique was adopted to exclude and delete the cases with missing data. The researcher relied on the histogram to detect outlier the data set, as indicated in the figure 4-3 below, which shows a histogram graphical display of variable Facilitating Conditions. The study analysis was based on the remaining 288 observations.

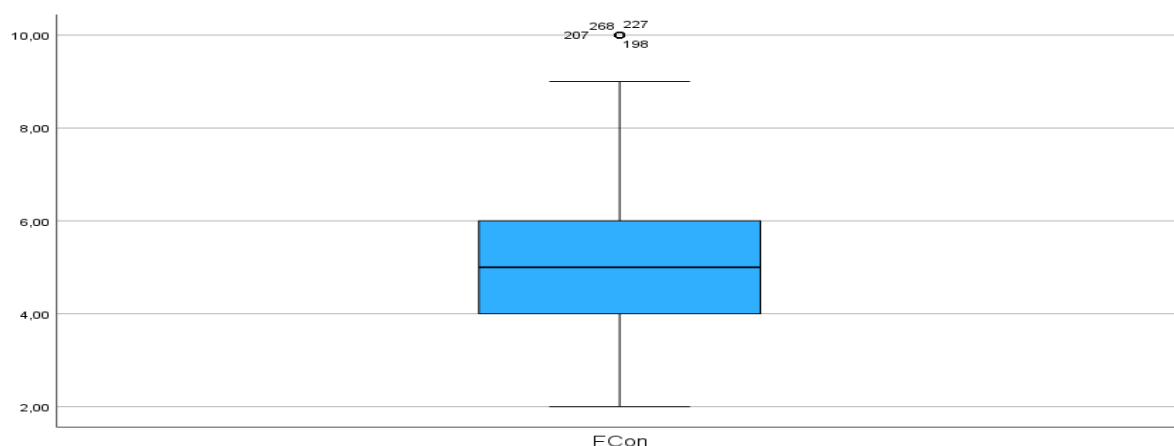


Figure 4- 3: Histogram (Facilitating Conditions)

4.14.1 Qualitative data analysis

Qualitative data come in different forms; it can be in the form of audio, written, or visual. Different types of approaches are available when it comes to qualitative data analysis. However, the choice of approach depends on the purpose of the study. In social science research, a researcher can choose from inductive, deductive, and grounded theories, which analyse the content of the study. Different tools are available to manage and assist the researcher in performing qualitative data analysis. For this study, Atlas. ti was used for qualitative data analysis.

4.14.1.1 Thematic analysis for qualitative data.

Thematic analysis is known to be the most used analysis technique in qualitative research, which involves detecting, analysing, and reporting themes from data (Javadi & Zarea, 2016); hence, to attain meaningful and valuable results, the researcher must conduct a thoroughness and methodical processes for the results to be accepted as trustworthy (Nowell et al., 2017). Thematic analysis is a procedure that systematically generates codes and themes from qualitative data, and its main aim is to identify and interpret key, but not necessarily all, features of the data, guided by the research question. (Clarke & Braun, 2015). Clarke and Braun further indicate that codes are the building blocks for themes, which are patterns of meaning underpinned by a central organising concept, a shared core idea.

According to Fereday and Muir-Cochrane (2006), thematic analysis involves searching for themes that emerge as essential or related to the phenomenon. As a part of the rigorous process, the researcher must read and re-read data. According to Byrne, (2021), Braun and Clarke, in their multiple publications, have proposed six phases (familiarisation: which listening and transcribing from voice recorder into word document, and noting down initial code; generating codes: on this stage, the researcher coded the interesting features coming from the entire data sets, and further gathered data related to the codes generated; generating themes: the third stage involves merging related codes to generate potential themes, reviewing potential themes: this stage involves reviewing themes are aligned to the coded themes and further generate additional themes, defining: refining themes and giving theme clear names, and naming themes, and lastly, producing a report: selection of extracts) a process attached to thematic analysis which is not linear process of moving forward but flexible enough to allow the researcher to move back and forth where necessary. In this study, the researcher adopted an inductive thematic analysis. Thus, code and themes were generated from the raw data, as indicated by Joffe (2012).

4.14.1.2 Inductive thematic analysis

The study adopted an inductive thematic data analysis involving rigorous reading through the interview transcripts. According to Azungah (2018), adopting inductive thematic data also allows the researcher to capture all critical aspects arising from data in response to research questions as themes are derived from the raw data; furthermore, this allows the researcher to pre-empt the possibility of a researcher forcing a predetermined result. This bottom-up data analysis recognises that themes are more related to data, are developed by extracting codes from data, and further transform codes into themes (Javadi & Zarea, 2016).

After transcription of audio recordings into text, the researcher familiarised himself with the data through rigorous reading. This includes spelling checks and other grammatical errors that may change the content's meaning. Through this initial phase, the familiarising phase of qualitative research, the researcher got a better feeling about data to build a clearer understanding of data, which is critical for code generation. The study adopted an In Vivo coding, which is referred to as a phrase or word extracted from the participant actual language as indicated by Saldaña, 2021. A word document was used to note down list of code generated from the initial coding phase. After initial coding, a highlight was used to establish categories leading into initial thematic map attached (see annexure 1a)

4.14.1.3 Integrating qualitative and quantitative strands (triangulation).

According to Ndanu & Syombua, 2015, triangulation is explained as a research method in social science research, which combines several research methods to study one thing. Triangulation come in different types or forms; however, this study adopted a data triangulation integration technique. According to Cameron & Sankaran, 2013, data triangulation involves using a variety of data sources in a study. In this study, the researcher, concurrently collected quantitative data in a form of questionnaire and qualitative data in a form of interviews. Convergent variant was adopted on discussion/interpretation stage of the study findings. Adopting convergence variation triangulation model enabled the researcher to merge quantitative strand and qualitative strand, which initially were independent on collection and analysis as supported by Ivankova & Creswell, 2009.

4.15 Ethical Considerations

Knowing that ethical research are issues likely to affect one's study is important (Paul et al., 2003). All researchers should be familiar with the basic ethical principles and have up-to-date knowledge about policies and procedures designed to ensure research subjects' safety and prevent sloppy and irresponsible research (Paul et al., 2003). The research process can create tension between the aim of generalising the findings and participants' rights to privacy.

Ethics pertains to doing well and avoiding harm. Harm can be prevented or reduced through the application of appropriate ethical principles (Orb et al., 2000). This study was guided by the ethical clearance letter issued by the University of Venda Higher Degrees Committee, and all respondents were issued with consent letters that stipulated that this research was purely academic without financial implications or payment for participating. Moreover, the consent letter clearly specifies that participants' rights are highly regarded and protected, and they are free to withdraw whenever they feel that they can no longer continue with the survey. The

study intends to understand how local government operates by interviewing one of the top managers within the institution. The research questionnaires will be kept secure, and qualitative participants will remain anonymous by not revealing their personal details or positions. The research observed the Nuremberg Code and the Universal Declaration of Human Rights, which, according to Roets (2017), are universally accepted principles of research ethics that protect human participants from harm and allow participants to give voluntary informed consent to the research. Furthermore, the South African Constitution was also observed.

4.16 Chapter Summary

This chapter outlined the research methodology underpinning the current study. Major sections covered include the research paradigm, approach, design, methods, target population, sampling techniques, data gathering techniques, and analysis tools to present the findings. The chapter gave a study of the philosophical, ontological, and epistemological strands. Furthermore, the chapter discussed the study data quality controlling techniques, and lastly, the chapter gave ethical considerations aligned to this study. The next chapter presents the descriptive statistical analysis of the results.

5 CHAPTER FIVE: QUANTITATIVE DATA ANALYSIS.

5.1 Introduction.

The Chapter gives a detailed description of the study, looking at the demographic profile (age, level of education, gender, and internet access) of the respondents. Furthermore, the descriptive analysis of variables was presented in the form of tables. Relationships between constructs were tested and discussed through regression and correlation analysis. Reliability and validity of the study was conducted through the exploratory factor analysis (EFA) and (Average Variance Extracted) on demonstrated using SPSS. Confirmatory Factor Analysis (CFA) was conducted to confirm the study factor structure and model fit.

5.2 Normality Test

Irrespective of the sample size, it is a prerequisite to run normality test, and this is very important for the meaningful conclusion (Mishra, Pandey, Singh, Gupta, Sahu, & Keshri, 2019. According to nor Ahad, Yin, Othman, and Yaacob (2011), this test needs to be done prior to Anova, correlation, t-test, or any other statistical test. Ghasemi and Zahediasl (2012) termed this statistical test parametric test, further indicating that most of tests assume that data flow on normal distribution.

This was further emphasized by Ahad et al. (2011) and Mishra et al. (2019) who state that the normality test hypnotised that data is normally distributed, thus a p value of >0.05 will result in null hypothesis accepted meaning data is normally distributed. In testing data normality, sample size is very important as indicated by Mishra et al. (2019) that for the medium-sized samples ($50 \leq n < 300$) sample distribution will be considered normal at absolute value of between -3.29 and 3.29 on skewness and kurtosis descriptive statistics, where skewness assesses the symmetry of the distribution and kurtosis its peakedness (Tabachnick & Fidell, 2007). A descriptive statistic in Table 5.1 shows that most of the variables are normally distributed.

Table 5.1: Descriptive Statistics

Descriptive Statistics								
N	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis		
Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Std. Error

Perceived Compatibility	288	2.00	10.00	8.1007	1.90367	-1.012	.144	.461	.286
Safety Perception	288	4.00	20.00	12.9618	3.81112	-.112	.144	-.691	.286
BI	288	4.00	15.00	12.3021	2.44288	-.864	.144	.353	.286
Facilitating Con	288	2.00	10.00	5.2083	1.91592	.326	.144	-.226	.286
Relative Advantage	288	9.00	35.00	27.3681	5.07950	-.905	.144	1.322	.286
Perceived complexity	288	5.00	25.00	20.7465	3.28469	-1.214	.144	2.993	.286
Valid (listwise)	N288								

Table 5.1 shows that all the constructs are normally distributed as skewness and kurtosis statistics are between the acceptable scale of the -3.29 and 3.29. Constructs perceived compatibility (**-1.012 - 0.461**), Safety Perception (**-0.112 -0.691**), Behaviour Intention (**-0.864- 0.353**), Facilitating Condition (**0.326- -0.226**), Relative advantage (**-0.905-1.322**), Perceived complexity (**-1.214 – 2.993**). The section below gives a study demographic representation through analysing participants biographical variable (Age, Gender, Level of education, Access to the internet and their competences in use of online technological tools platforms).

5.3 Demographic profile of the study

The demographic profile shows that the study was largely dominated by youth constituting more than 80% of the analysed data. This was expected as most of the older people in developing countries lack information systems and emerging technologies knowledge.

However, in the study done by Nguyen, Phan, Le, and Nguyen (2020), they found that as control variables, gender, level of education, age, and frequently use of internet has no impact on significant impact on citizens satisfaction on e-government. Furthermore, the study was dominated by females making 54.5 % of the study participants. The study was also dominated by people with a university degree making 39,6 %. The study also shows that 95,5% of the participants can access internet every day. This is not surprising, with high development in

internet distribution in developing countries. Lastly, the study profile shows that information systems literacy is continuing to improve with 71.2% indicating that they can adequately use online and other technological applications.

Table 5.2: Age distribution.

Participants Age.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Between 18 and 25	117	40.6	40.6	40.6
	Between 26 and 35	135	46.9	46.9	87.5
	Between 36 and 45	26	9.0	9.0	96.5
	Between 46 and 55	7	2.4	2.4	99.0
	56 and above	3	1.0	1.0	100.0
	Total	288	100.0	100.0	

Table 5.2 shows the study sample size was largely dominated by youth between the ages of 26 and 35, making 46.9% of the sample size, followed by another youthful group of the ages between 18 and 25, making 40,6 % of the sample. Furthermore, the table shows that the remaining 12,4% of the sample size was shared by participants between the ages of 36 and 45, 46 and 55 and the 55 and above, making 9,0%, 2,4% and 1% respectively. In the information age, the variable age is very significant as the previous literatures show the huge disparity in usage of computing application and literacy between the young and old.

Table 5.3: Online platforms competence.

Age. * Competences in use of online platforms Crosstabulation							
		Competences in use of online platforms				Total	
		Very bad	Bad	Fair	Good		
Age.	Between 18 and 25	Count	1	2	36	78	117
		% of Total	0.3%	0.7%	12.5%	27.1%	40.6%
	Between 26 and 35	Count	7	0	32	96	135

	% of Total	2.4%	0.0%	11.1%	33.3%	46.9%
Between 36 and 45	Count	0	0	1	25	26
	% of Total	0.0%	0.0%	0.3%	8.7%	9.0%
Between 46 and 55	Count	0	0	3	4	7
	% of Total	0.0%	0.0%	1.0%	1.4%	2.4%
56 and above	Count	0	0	1	2	3
	% of Total	0.0%	0.0%	0.3%	0.7%	1.0%
Total	Count	8	2	73	205	288
	% of Total	2.8%	0.7%	25.3%	71.2%	100.0%

Citizen's age has been examined as a determining factor affecting users' acceptance of information systems platforms. Furthermore, age has been found to be related to citizens abilities to use online platforms. Our study results shown in Table 5.3 shows that 33.3% of participants between the ages of 26 and 35 are good online platforms users. On participants who are between the age of 18 and 25, 27.1% indicated that they are good users of online platforms. Most (25 of 26) of the participants between the ages of 35 and 45 are good mobile platforms users. Most interestingly participants above the age of 55 also indicated that are good mobile platforms users.

5.3.1 Participants Internet Usage

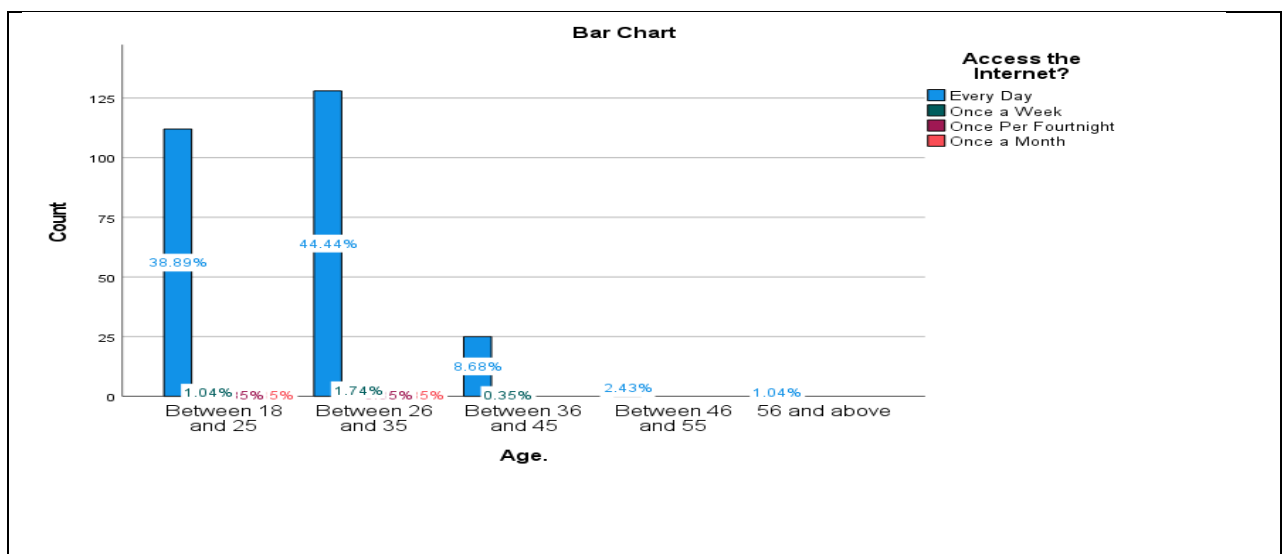


Figure 5-1: Internet accessibility and use.

Our study results in Figure 5-1 show that participants who are regular internet users are those who are between the ages of 25 and 35. This is followed by youth between the ages of 18 and 25 making 38.89%. Interestingly, the highest number of participants who are not regular users are between the ages of 26 and 35 with 11.74% and those between 18 and 25 making 11.04%. However, those who are over the age 45 are regular internet user. This means that in this study we cannot conclude that age is a determinant of individual rate of using internet.

5.3.2 Participants' Gender

Table 5.4: Gender distribution.

Gender					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	131	45.5	45.5	45.5
	Female	157	54.5	54.5	100.0
	Total	288	100.0	100.0	

Table 5.4 represent the percentage in gender distribution in the study sample size. The results show that the sample was largely dominated by females making (157 =54.5%) of the study sample, with male making (131=45,5%).

5.3.3 Level of Education.

Level of education has been discussed in the literature as one of the demographic factors in line with perception towards emerging technologies application, hence it is valuable to show the representations of level of education variable in a sample size. The Table 5.5 shows that the sample was dominated by participants with university degrees, making (114=39.9%) of the sample size.

Table 5.5: Participants level of education.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Below Grade 12	15	5.2	5.2	5.2
	Grade 12	46	16.0	16.0	21.2

College Diploma	41	14.2	14.2	35.4
University Degree	114	39.6	39.6	75.0
Postgraduate	72	25.0	25.0	100.0
Total	288	100.0	100.0	

This is followed by participants with postgraduate qualifications making (72=25% of the sample size). Furthermore, the results show that 16 % of the sample size have only completed their grade 12.

Table 5.6: Level of education and abilities to use online-based platforms.

		Competences in use of online platforms					Total
		Very bad	Bad	Fair	Good		
Level of Education.	Below Grade 12	Count	0	0	5	10	15
		% of Total	0.0%	0.0%	1.7%	3.5%	5.2%
	Grade 12	Count	1	0	12	33	46
		% of Total	0.3%	0.0%	4.2%	11.5%	16.0%
	College Diploma	Count	1	0	11	29	41
		% of Total	0.3%	0.0%	3.8%	10.1%	14.2%
	University Degree	Count	4	2	35	73	114
		% of Total	1.4%	0.7%	12.2%	25.3%	39.6%
	Postgraduate	Count	2	0	10	60	72
		% of Total	0.7%	0.0%	3.5%	20.8%	25.0%
Total		Count	8	2	73	205	288
		% of Total	2.8%	0.7%	25.3%	71.2%	100.0%

Existing literature suggests that level of education and digital literacy are mediating factors in determining users' acceptance of technologies. Our study results in Table 5.6 show that most (39.6%) of the participants with university degrees are good online platforms users. Furthermore, 25.0% of whom are postgraduates are also good online platforms users. However, our study shows that out of 8 of the study participants who are very bad in utilising online platforms, 6 are the participants with university degrees and postgraduates. This is different for those who are either still yet to complete grade 12 or never completed their grade 12. Our study further indicates that out of 15 of those who are yet to complete their grade 12 or who never completed their grade, 10 are good online platforms users and 5 are average users. This suggests that level of education is not a determining factor in determining users' competences in using online platforms.

5.3.4 Level of education and internet accessibility

Figure 5-2 shows that regular internet users are those with university degree with 37.50 % of total sample size. Furthermore, our study indicates that 25% of internet users are postgraduates. Our study also reveals that some of the least utilisers of internet are those with university degrees, which is not the case with participants with grade 12 and below grade 12. This shows that internet use cannot be determined by how educated an individual is.

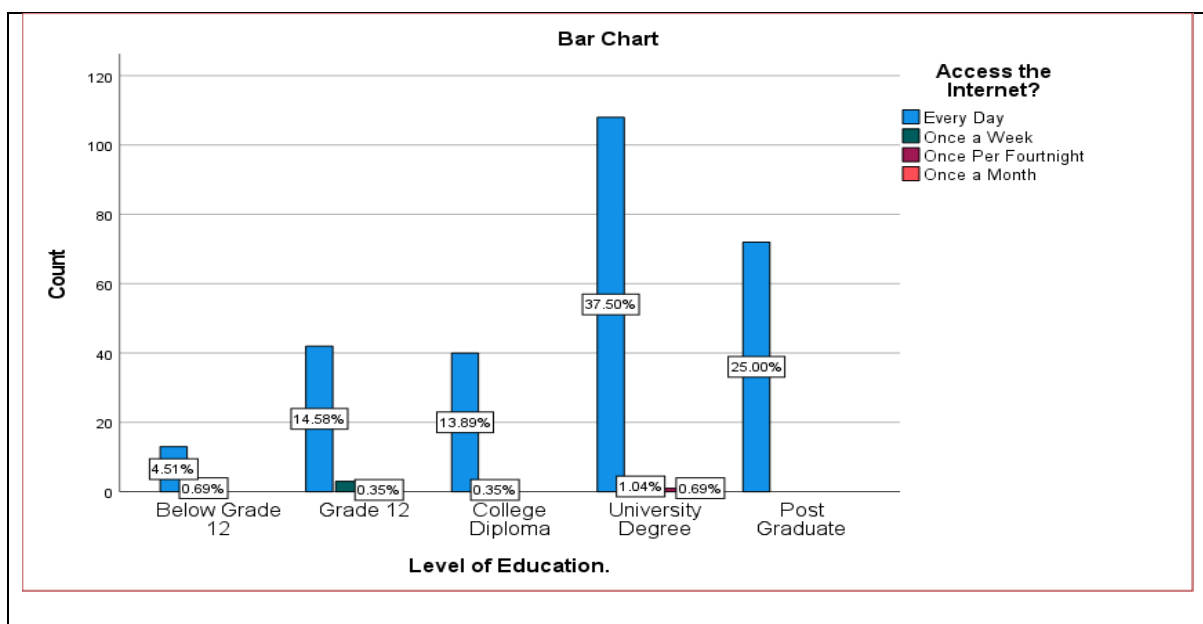


Figure 5- 2: Internet accessibility and level of education.

5.3.5 Access to the Internet

Organisations and people in developing countries have seen a significant transformation in how they interact between business and business, business and customers, customers to customers and government to customers. These are the results of high internet connectivity. Traditional methods of interaction are becoming obsolete, and most organisations are now

eliminating them in their business models in favour of emerging technologies such as artificial intelligence, Internet of Thing, Social Media platform and mobile applications which are internet-based modes of interactions and operations. This is supported by a Nguyen, Phan, Le and Nguyen (2020), who indicate that technological evolution has resulted in public sector redefining their e-government models with the aim of solving the existing managerial problems. Due to the emerging technologies dependence on the internet, it is very significant to understand participants access to the internet and utilisation. Table 5.7 shows the distribution in internet access in the study sample size.

Table 5.7: Internet usage.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Every Day	275	95.5	95.5	95.5
	Weekly	9	3.1	3.1	98.6
	Per Fortnight	2	.7	.7	99.3
	Monthly	2	.7	.7	100.0
	Total	288	100.0	100.0	

The results in Table 5.7 show that 95.5% of the sample size are regular internet users, which is an enabler of online based applications and emerging technologies. In the digital era, high number of internet users does not only present an opportunity for digital market, but also enable transforming organisations' business model into automated business processes. The table also indicates that 3.1% of the sample size can only access the internet once a week. Furthermore, the results also indicate that 0,7% of the study participants can access the internet once per fortnight and once a month respectively.

5.3.6 Online Systems Literacy

The study has already discovered high internet accessibility in the targeted study area. This translates into digital literacy on the study sample. In this study, internet literacy is defined as abilities of individual to navigate and utilise internet-based application. Table 5.8 shows the distribution in participants' abilities to navigate and use online platforms.

Table 5.8: Internet accessibility and online competence.

Competences in use of online platforms					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very bad	8	2.8	2.8	2.8
	Bad	2	.7	.7	3.5
	Fair	73	25.3	25.3	28.8
	Good	205	71.2	71.2	100.0
	Total	288	100.0	100.0	

According to Reffat, (2003), one of the benefits of e-government is to reduce digital divide gap in previously disadvantage regions by offering computer literacy to everyone. Computer literacy is a key element on the acceptance and use of technologies. The result in Table 5.8 shows that 205 =71.2% of the sample size are good in navigating and utilisation of online applications. This provides a foundation for both local municipalities and the public. Furthermore, the study shows that 25, % of the sample size have fair (average) share of skills in navigating and using online platforms. The study also reveals that 3.5% of the sample size have got limited skills in the use of online platforms.

5.4 Interest on local government online based services

Table 5.9: Interest of the idea of e-services.

Age. * Interest in online based services Crosstabulation								
			Interest in online based services				Total	
			Very Bad	Bad	Not Sure	Good		Very Good
Age.	Between 18 and 25	Count	3	5	12	40	57	117
		% within Age.	2,6%	4,3%	10,3%	34,2%	48,7%	100,0%
		% within Attitude 1	23,1%	33,3%	50,0%	40,4%	41,6%	40,6%
		% of Total	1,0%	1,7%	4,2%	13,9%	19,8%	40,6%
	Between 26 and 35	Count	9	8	9	41	68	135
		% within Age.	6,7%	5,9%	6,7%	30,4%	50,4%	100,0%
		% within Attitude 1	69,2%	53,3%	37,5%	41,4%	49,6%	46,9%
		% of Total	3,1%	2,8%	3,1%	14,2%	23,6%	46,9%

	Between 36 and 45	Count	1	0	2	12	11	26
		% within Age.	3,8%	0,0%	7,7%	46,2%	42,3%	100,0%
		% within Attitude 1	7,7%	0,0%	8,3%	12,1%	8,0%	9,0%
		% of Total	0,3%	0,0%	0,7%	4,2%	3,8%	9,0%
	Between 46 and 55	Count	0	2	1	4	0	7
		% within Age.	0,0%	28,6%	14,3%	57,1%	0,0%	100,0%
		% within Attitude 1	0,0%	13,3%	4,2%	4,0%	0,0%	2,4%
		% of Total	0,0%	0,7%	0,3%	1,4%	0,0%	2,4%
	56 and above	Count	0	0	0	2	1	3
		% within Age.	0,0%	0,0%	0,0%	66,7%	33,3%	100,0%
		% within Attitude 1	0,0%	0,0%	0,0%	2,0%	0,7%	1,0%
		% of Total	0,0%	0,0%	0,0%	0,7%	0,3%	1,0%
Total	Count	13	15	24	99	137	288	
	% within Age.	4,5%	5,2%	8,3%	34,4%	47,6%	100,0%	
	% within Attitude 1	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	
	% of Total	4,5%	5,2%	8,3%	34,4%	47,6%	100,0%	

e-government has been in existence for at least two decades now, more especially in developed countries due high internet accessibility, positive attitude, and positive perception. According to Nguyen et al. (2020), e-government is a continuing evolution trend moving aiming to solve the current managerial problems in the currently adopted value proposition in the public sector. In the digital era, where organisations decisions are data driven, and where private organisations have taken a leading role in driving innovation of emerging technologies has become a primary component in organisation digital transformation and organisation change. Information technologies evolution in different sectors, including the public sector, contribute more to the citizens standard of living and satisfaction of their demands (Nguyen et al., 2020). Our results in table 5.9 show that 82% (34.4% good and 47.6% very good) are interested in online based service local municipality interaction. Furthermore, our study shows that 8.3% of our participants are unsure about e-services. Lastly, our study shows that 9.7% of our sample are not interested in shifting local municipalities' services online.

5.5 Advance Analysis Statistics

The following section shows the advanced statistics for the study generated from the SPSS. Different statistical tools were applied, such as reliability tests, correlation and regression analysis.

5.5.1 Reliability Test

According to Amirrudin et al. (2021), it is more significant to examine the reliability of an instrument and define the meaning of Cronbach's Alpha, which, according to McNeish (2017), is by far the most common internal consistency reliability measure. In Cronbach Alpha analysis, the coefficient values are measured in a range between 0 and 1, where a coefficient value of close to 0 indicates lower agreement between the items, and a higher value indicates higher agreement between the items. The test shows that the Cronbach Alpha analysis results in Table 5.10 indicate the reliability test alpha coefficient value of 0.881, which is adequate to continue with the analysis.

Table 5.10: Cronbach Alpha.

Reliability Statistics	
Cronbach's Alpha	N of Items
.881	25

5.5.2 Independent construct's reliability test

Safety perception (4), Relative Advantage (7), Perceived Complexity (2), Behaviour Intention (5), Facilitating Conditions (4) and Perceived Compatibility (3).

Table 5.11: Independent construct reliability test.

Constructs	Number of Items	Cronbach alpha
Safety perception	4	.747
Relative Advantage	7	.755
Facilitating Conditions	4	.543
Perceived Compatibility	3	.637
Perceived Complexity	2	.697
Behaviour Intention	5	.740

Table 5.11 shows the Cronbach alpha scale of independent constructs (items) are all greater than 5 which is considered acceptable, in line with Alagele (1997). This means that our model constructs are fit for further analysis such as exploratory factor analysis.

5.5.3 Exploratory Factor analysis

Table 5.12: KMO and Bartlett's Test.

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.873
Bartlett's Test of Sphericity	Approx. Chi-Square	2314.950
	df	253
	Sig.	.000

The KMO of equal or greater than 0.6 and Bartlett's Test of Sphericity significant level of $<,001$ indicate adequacy in sample used. To test the sample adequacy the KMO test was conducted, and the results as shown in Table 5.12 show the KMO of 0.873 which is adequate as indicated by Rasheed and Abadi (2014) that the KMO test result of greater than 0.7 is adequate. This was also supported by UI Hadi, Abdullah and Sentosa who further indicate that a KMO value of between 0.7 and 0.8 is good and the significant level of $<,001$ which is less than cut-off of 0.50, therefore we have enough evidence to continue with the exploratory factor analysis.

5.5.4 Exploratory Factor Analysis.

Exploratory factor analysis is a process of clustering study variable, and by doing so we can reduce the large number of observed variables into smaller number of variables, and this is done through factor extraction and factor rotation (UI Hadi, Abdullah & Sentosa, 2016). Table 5.13 shows the total variance explained. Traditionally, EFA is done to explore the underlying factor structure and by doing so the factor structure is identified (Suhr, 2006). For underlying interrelation between variables, 25 variables distributed across 6 pre-identified constructs (generated from the theories to form a conceptual framework) were analysed through dimension reduction factor analysis.

Table 5.13: Total Variance Explained.

Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %

1	6.856	29.808	29.808	6.856	29.808	29.808	3.121	13.569	13.569
2	1.871	8.134	37.942	1.871	8.134	37.942	2.956	12.854	26.423
3	1.675	7.285	45.227	1.675	7.285	45.227	2.439	10.603	37.026
4	1.413	6.145	51.371	1.413	6.145	51.371	2.272	9.878	46.904
5	1.170	5.086	56.458	1.170	5.086	56.458	1.658	7.207	54.112
6	1.056	4.592	61.050	1.056	4.592	61.050	1.596	6.938	61.050
7	.870	3.785	64.834						
8	.854	3.714	68.548						
9	.774	3.366	71.914						
10	.730	3.175	75.088						
11	.638	2.774	77.862						
12	.619	2.690	80.552						
13	.544	2.364	82.916						
14	.512	2.224	85.141						
15	.477	2.072	87.213						
16	.466	2.027	89.240						
17	.437	1.898	91.139						
18	.402	1.748	92.887						
19	.367	1.597	94.484						
20	.360	1.567	96.051						
21	.327	1.423	97.474						
22	.314	1.364	98.837						
23	.267	1.163	100.000						

Extraction Method: Principal Component Analysis.

Total Variance Explained an output of exploratory factor analysis shown in Table 5.13, was extracted on the Eigenvalue of greater than 1. The dimension reduction analysis results in Table 5.13 show six (6) underlying constructs or interrelations between variables that were identified. This means that our factor structure is now composed of 6 predefined constructs. The six constructs are discussed and illustrated in Table 5.14.

Factor 1 comprised of 7 items loading from 0.478 to 0.776, factor 2 comprised of 5 items loading from 0.500 to 0.789, factor 3 comprised of 4 items loading from 0.638 to 0.803, factor 3 comprised of 3 items loading at 0.542 to 0.847, factor 5 comprised of 2 items loading at 0.780 to 0.845, and lastly factor six which is comprised of 2 items loading from 0.811 to 0.828.

Table 5.14: Rotated Component Matrix.

	Component					
	1	2	3	4	5	6
Pcompa1					.845	
Pcompa2					.780	
RA6	.502					
FC1						.828
FC2						.811
UBI3				.823		
UBI2				.847		
UBI1				.542		
RA7	.776					
RA5	.624					
RA4	.656					
SP1			.638			
RA3	.622					
SP2			.803			

RA2	.538					
SP3			.667			
PCO1		.500				
RA1	.478					
PCO2		.731				
PCO3		.728				
PCO4		.789				
PCO5		.624				
SP4			.772			

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalisation.

a. Rotation converged in 5 iterations.

Rotated Component Matrix (Table 5.14) shows the six (6) factors with the Eigenvalue of greater than 1 and where they are loading. This is extracted from the summarised component of our Total Variance Explained.

Factor 1: Relative Advantage (RAD) comprised of variables (Chatbots will improve local government responses, Self-serving kiosk will offer better services than human being, paying my bills online will save me money and time, RA Use of technologies will enable me to pay my service bills faster than office, RA I would like to use self-service kiosk and chatbot to interact with local municipality, RA Robots and other Sensors will help local municipality to solve water and electricity problems).

Factor 2: Behaviour Intention (UBI) comprised of (BI I want to use online application technologies as a method of interacting with municipalities, BI I want to report services outages using artificial Chabot, BI I want to attend municipalities meetings on Ms Teams, Skype or Zoom).

Factor 3: Safety Perception (SPE) comprised of (SP I can't share my personal information with anyone online, SP I don't want to be tracked on my social media activities, SP I have no

problems with local government creating my online profile, SP Online tracking is violating my privacy).

Factor 4: Perceived Complexity (PComple) comprised of (Mobile payment systems are very complicated and difficult to use. Social media and chatbots platforms are easy to use. Self-serving kiosks are very complex to use).

Factor 5: Facilitating Conditions (FC) comprised of (I have the right knowledge and skills to use different emerging technological platforms, I have right resources to access and use emerging technologies platforms).

Factor 6: Perceived Compatibility (PCOM) comprised of (I prefer to use online platforms; I prefer automated services).

5.5.5 Construct Convergence Validity

According to Taherdoost (2020), the concept of validity in research explains how data collected by researcher measure the actual area the researcher wanted to investigate about. The convergence validity test shown below indicates the items loadings across six components representing six constructs. Furthermore, Table 5.15 shows the average variance extracted of above 0.40 which according to Taherdoost is fit to be included for further analysis, with one construct closer to 4 with an AVE of 0.37.

Table 5.15: Average Variance Extracted

Rotated Component Matrix ^a						
	Component					
	1	2	3	4	5	6
Pcompa1					.845	
Pcompa2					.780	
RA6	.502					
FC1						.828
FC2						.811
UBI3				.823		
UBI2				.847		
UBI1				.542		

RA7	.776					
RA5	.624					
RA4	.656					
SP1			.638			
RA3	.622					
SP2			.803			
RA2	.538					
SP3			.667			
PCO1		.500				
RA1	.478					
PCO2		.731				
PCO3		.728				
PCO4		.789				
PCO5		.624				
SP4			.772			
AVE	0.37	0.47	0.52	0.56	0.67	0.67

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalisation.

a. Rotation converged in 5 iterations.

Factor 1: RA (relative advantage) has 7 items with the factor loading ranging from 0.478 to 0.776 (AVE of 0.37). Factor 2: PCO (perceived complexity) has 5 items representing the construct with the factor loading range from 0.500 to 0.789 (AVE of 0.47). Factor 3 SPE (safety perception) has 4 items in it with factor loading range from 0.638 to 0.803 (AVE of 0.52) Factor 4 UBI has got 3 items in it with loading from 0.542 to 0.847 (AVE of 0.56), Factor 5: Pcom (perceived compatibility) has got 2 items in it with the factor loading range from 0.780 to 0.845

(AVE of 0.67), and lastly factor 7 FC (facilitating conditions) which has got 2 items on it loading from 0.811 to 0.828 and AVE of 0.67).

5.6 Emerging Technologies Relative advantage in local municipality

Emerging technologies such as self-serving kiosks, artificial chatbots and sensors, cloud computing, Social Media platforms are disrupting service delivery ecosystem for both private and government sectors. However, Bohnsack and Pinkse (2017) argue that technologies are only considered disruptors if customers accept and value them. Acceptance of technologies can be influenced by different constructs as discussed in chapter three of this study. Table 5.16 shows the descriptive statics results when the participants were asked if adopting emerging technologies in rural municipalities will offer both municipality and citizens more benefits than the current model of service delivery and interaction.

Table 5.16: Relative Advantage Descriptive Statistic

Descriptive Statistics									
	N	Minimum	Maximum	Mean	Std.	Skewness	Kurtosis		
	Statistic	Statistic	Statistic	Statistic	Deviation	Statistic	Statistic	Std.	Std.
					Statistic	Statistic	Statistic	Error	Error
Chatbots will improve local government responses.	288	1	5	3.73	1.137	-.857	.144	.152	.286
Self-serving kiosk will offer better services than human being.	288	1	5	3.55	1.144	-.492	.144	-.546	.286
Use of technologies will enable me to pay my service bills fast than office	288	1	5	4.18	1.088	-1.696	.144	2.400	.286

Automated machines and internet will enhance service delivery	288	1	5	4.05	.979	-1.196	.144	1.370	.286
Online platforms will allow me to pay my services faster	288	1	5	4.26	.903	-1.776	.144	3.823	.286
I would like to use self-service kiosk and chatbot to interact with local municipality	288	1	5	3.96	.892	-.932	.144	1.176	.286
Robots and other Sensors will help local municipality to solve water and electricity problems.	288	1	5	3.64	1.136	-.629	.144	-.374	.286
Relative Advantage Mean	288	1.29	5.00	3.9797	.67287	-.890	.144	1.545	.286
Valid N (listwise)	288								

The descriptive statistics results shown in Table 5.16 show an average mean of 3.97, implying that participants believe that the emerging technology-based service delivery model will offer more benefits than a traditional business model currently adopted in rural local municipalities. This corresponds with the high technological demand to initiate the human interaction-based business model discovered in this study. On a scale of 1 to 5, 5 represents strongly disagree, 4 = agree, 3 = neutral, 2 = disagree, and 1 = strongly disagree. Across the seven variables measuring relative advantage construct, only variable, Self-serving kiosk will offer better services than a human being, has a mean of not closer to four with a mean of 3.55. Variable chatbots will improve local government responses, with a mean of 3.73, which can

be rounded to 4. Variable Robots and other Sensors will help local municipality to solve water and electricity problems, has a mean of 3.64. Online platforms will allow me to pay my services faster, has a mean of 4.26. Use of technologies will enable me to pay my service bills faster than office, has a mean of 4.18 and lastly, Automated machines and internet will enhance service delivery has a mean of 4.05. This shows that participants believe that integrating emerging technologies on local municipalities service delivery model will benefit them more as compared to the existing business model.

Table 5.17: Correlations between relative advantage and behaviour intention to use and adopt emerging technologies.

Correlations			Self- servin g kiosk Use will improve local governme nt responses.	Automat ofed machine and internet will enhance service delivery	Online platfor ms allow me to pay my service s faster	I would like to use self- service kiosk chatbot to interact with local municipali ty	Robots and other Sensors will help local municipali ty to solve water and electricity problems. BI
Chatbots will improve local governme nt responses.	Pearson Correlati on N	-- 288					
Self- serving kiosk offer better services	Pearson Correlati on Sig. (2- tailed)	.304** (2-<,001 tailed)	--				

than human being.	N	288	288						
Use of technology will enable me to pay my service bills faster than office	Pearson Correlation	.267**	.432**	--					
	Sig. (2-tailed)	<,001	<,001						
Automated machines and internet will enhance service delivery	N	288	288	288					
	Pearson Correlation	.384**	.486**	.508**	--				
	Sig. (2-tailed)	<,001	<,001	<,001					
Online platforms will allow me to pay my services faster	N	288	288	288	288	288			
	Pearson Correlation	.257**	.424**	.544**	.525**	--			
	Sig. (2-tailed)	<,001	<,001	<,001	<,001				
I would like to use self-service kiosk and chatbot to	N	288	288	288	288	288			
	Pearson Correlation	.258**	.410**	.373**	.488**	.467**	--		
	Sig. (2-tailed)	<,001	<,001	<,001	<,001	<,001			

interact with local municipality	N	288	288	288	288	288	288		
Robots and Sensors will help local municipality to solve water and electricity problems.	Pearson Correlation	.311**	.373**	.384**	.517**	.385**	.420**	--	
	Sig. (2-tailed)	<,001	<,001	<,001	<,001	<,001	<,001		
	N	288	288	288	288	288	288	288	
BI	Pearson Correlation	.304**	.327**	.412**	.351**	.348**	.296**	.367**	--
	Sig. (2-tailed)	<,001	<,001	<,001	<,001	<,001	<,001	<,001	
	N	288	288	288	288	288	288	288	288
** . Correlation is significant at the 0.01 level (2-tailed).									

The correlation results in Table (5.17) show a positive strong relationship between behaviour intention to adopt and use emerging technologies and its abilities to offer instant responses through chatbot which is an upgrade to telephone and emailing with the r value of 0.304 and level of significant of <0.001. The results further indicate a positive strong relationship between behaviour intentions to use emerging technologies and use of self-serving serving kiosks which is perceived to have potential to offer better services that human beings in local government service delivery channels with the r value of 0.327 and level of significance of <0.001. The study also shows the positive relationship between instant payment on mobile payment applications which are perceived to offer better payment services than traditional method of payment and behaviour intentions to adopt and use emerging technologies, with

the r value of 0.412 and significant level of <0.001. Furthermore, the study shows the strong positive relationship between use of automated processes in local municipalities service delivery business model which are perceived to have potential to offer better service than traditional business processes and the behaviour intention to use and adopt emerging technologies, with the r value of 0.351 and level of significance of <0.001. The study also shows the moderate relationship between use of chatbot and self-serving kiosk which are perceived to offer better interaction service between local municipality and citizens than traditional service delivery business model and behaviour intention with the r value of 0.296 and p value of <0.001. Lastly our correlation results show that there is a strong relationship between use of sensors and robots to detect defects of basics services hot spots which are perceived to offer better service than relying on human being and behaviour intentions to use and adopt emerging technologies in local municipalities, with an r value of 0.367 and level of significant of <0.001.

5.7 Facilitating Conditions

Individuals' knowledge, skills and understanding, resources and access to resources have been discovered to be some of the major factors contributing to their behaviour intention to accept and use innovations. And different scholars already discovered that individuals with right skills and good understanding on innovation, are more likely to accept and adopt technological innovation.

Table 5.18: Facilitating Conditions Anova

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	9.840	2	4.920	.823	.440 ^b
	Residual	1702.879	285	5.975		
	Total	1712.719	287			

a. Dependent Variable: BI

b. Predictors: (Constant), I have the right knowledge and skills to use different emerging technological platforms, I have right resources to access and use emerging technologies platforms.

The ANOVAa table 4.18 shows the F value of (0.823) =2.285, with the significant level of 0.440. This shows that facilitating condition does not significantly correlate with dependent variable (Behaviour Intention).

5.8 Safety perception.

Emerging technologies acceptance is continuing to be a centre of attention for many academics in information systems, and one factor of interest is the safeness on use of these technologies. Several studies in information systems have discovered that trust, security, and privacy are major determining factors in acceptance and use of technologies.

Major concerns over emerging technologies are on the extreme level. Emerging technologies are internet based and their abilities to perform tasks which were previously known to be impossible such as tracking individual current location, and abilities to target and obtain users information by monitoring users' activities online with/without user consent. As a result, sensitive personal information can be left exposed. This includes their home and work addresses, health conditions, and religious affiliations as indicated by (Yigitcanlar, Li, Beeramoole & Paz, 2023). The descriptive statistics below in table 5.19, shows the average mean of 3.24 (Std=0.95) of the construct safety perception and variables measuring it. In a scale range of strongly disagree to strongly agree where 1 represents strongly disagree and 5 representing strongly agree, the average mean of 3.24 is slight below 4, therefore based on descriptive statistics conducted, we cannot conclude that participants believe that the use of emerging technologies as a model of service delivery in rural local municipalities will pose safety threats. The mean of 3.24 shows that most of the people are slightly neutral on the safeness of emerging technologies in local government service delivery business model.

Table 5.19: Safety perception descriptive statistics.

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
SP I can't share my personal information with anyone online	288	1	5	3.52	1.117
SP I don't want to be tracked on my social media activities	288	1	5	2.94	1.368

SP I have no problems with local government creating my online profile	288	1	5	3.40	1.197
SP Online tracking is violating my privacy	288	1	5	3.10	1.356
SPMEAN	288	1.00	5.00	3.2405	.95278
Valid N (listwise)	288				

To understand the relationship between safety perception construct and dependent variable behaviour intention to adopt and use emerging technologies in local government, a bivariate correlation analysis was conducted. Below (Corelation table 5.20.) are the results of the conducted correlation analysis.

Table 5.20: Safety perception and behaviour intentions.

Correlations		BI	I can't share my personal information with anyone online	I don't want to be tracked on my social media activities	I have no problems with local government creating my online profile
I can't share my personal information with anyone online	Pearson Correlation	.279**			
	Sig. (2-tailed)	<,001			
	N	288			
I don't want to be tracked on my social media activities	Pearson Correlation	.101	.439**		
	Sig. (2-tailed)	.088	<,001		
	N	288	288		

I have no problems with local government creating my online profile	Pearson Correlation	.238**	.416**	.452**	
	Sig. (2-tailed)	<,001	<,001	<,001	
	N	288	288	288	
Online tracking is violating my privacy	Pearson Correlation	.084	.366**	.516**	.363**
	Sig. (2-tailed)	.153	<,001	<,001	<,001
	N	288	288	288	288
**. Correlation is significant at the 0.01 level (2-tailed).					

The results in table 5.20 show the relationship between the four (4) independent variable measuring safety perception (SP I can't share my personal information with anyone online, SP I don't want to be tracked on my social media activities, SP I have no problems with local government creating my online profile, SP Online tracking is violating my privacy) and behaviour intention. The results show that there is positive relationship between level of trust (I can't share my personal information with anyone online) and behaviour intention to adopt and use emerging technologies with the r value of 0.279 and p value of <0.001 which is significant. Level of security (I don't want to be tracked on my social media activities) and behaviour intention are showing a weak relationship with the r value of 0.101 and level of significant of $=0.088$, which is not significant. Furthermore, a moderate relationship between level of privacy (I have no problems with local government creating my online profile) and behaviour intentions discovered with the r value of 0.238 and significant at <0.001 . Lastly our correlation results show a weak relationship between SP Online tracking is violating my privacy and behaviour intention with the r value of 0.084 and p value of $=0.153$.

In justification of combining both privacy, trust and security, the results show that the positive relationship between variables under construct safety perception (SP I can't share my personal information with anyone online positively correlates with, SP I don't want to be tracked on my social media activities with an r value of 0.439 and p value of <0.001 . Furthermore, it positively correlates with SP I have no problems with local government creating my online profile with the r value of 0.452 and p value of <0.001 . Lastly it correlates with SP Online tracking is violating my privacy with an r value of 0.363 and p value of <0.001 . The positive

relationship between security, trust and privacy concerns supports the statement by Balapour, Nikkhah, and Sabherwal (2020) who argue that the three are exclusively mutual.

5.8.1 Linear regression analysis.

A linear regression analysis was conducted to understand the impact of each variable measuring safety on the dependent variable. The model summary below in table 5.21 indicates the regressed results dependent variable and the predictor construct safety perception towards dependent variable behaviour intentions to adopt and use emerging technologies systems in local government. Adjusted R Square of 0.89, translating into 8.9% of public behaviour intention to adopt and uses emerging technologies business model can be explained by the participants' safety perception towards emerging technologies systems.

Table 5.21: Safety Perceptions Model summary

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.320 ^a	.102	.089	2.33101
a. Predictors: (Constant)Online tracking is violating my privacy, I have no problems with local government creating my online profile, I can't share my personal information with anyone online, I don't want to be tracked on my social media activities.				

Furthermore, the ANOVAa table 5.22, shows the F value of (4,283) =8.052, with the significant level of <0.001. This shows that safety perception is significantly correlating with dependent variable (behaviour intention to use emerging technologies-based business model).

Table 5.22: Safety Perception Anova.

ANOVA^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	175.009	4	43.752	8.052	<,001 ^b
	Residual	1537.710	283	5.434		
	Total	1712.719	287			
a. Dependent Variable: BI						

b. Predictors: (Constant) Online tracking is violating my privacy, I have no problems with local government creating my online profile, I can't share my personal information with anyone online, I don't want to be tracked on my social media activities.

The coefficients on Table 5.23 show the impact of each independent variable measuring safety perception on the dependent variable (BI). The results indicate that that two variable measuring safety perception on emerging technologies systems are significantly correlating with BI into use and adoption of emerging technologies systems value proposition. Our study shows that, predictor variable I can't share my personal information with anyone online has a standardised coefficient $\beta = .249$, t value of 3.781, and level of significant $<.001$. This means that the abilities of emerging technologies to monitor and access citizens personal information online can moderately affect users' behaviour intentions to adopt and use emerging technologies-based business model in local municipalities.

Predictor variable I don't want to be tracked on my social media activities has a standardised coefficient β of -0.072, t value -1.004, and level of significant =0.316), which is not significant. This shows a negative relationship between variable I don't want to be tracked on my social media activities and BI. This means that abilities of emerging technologies to track and monitor citizens online activities can negatively affect their perception towards emerging technology-based business models in local municipalities.

Table 5.23: Safety Perceptions and Behaviour Intention Coefficients.

Coefficients ^a		Unstandardised Coefficients		Standardised Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	9.708	.523		18.561	<.001
	I can't share my personal information with anyone online	.544	.144	.249	3.781	<.001
	I don't want to be tracked on my social media activities	-.128	.128	-.072	-1.004	.316

I have no problems with local government creating my online profile	.367	.135	.180	2.720	.007
Online tracking is violating my privacy	-.063	.121	-.035	-.516	.606
a. Dependent Variable: BI					

Furthermore, the results in Table 5.23 show that predictor variable (I have no problems with local government creating my online profile) has the standardised coefficient $\beta = 0.180$, t value of 2.720, and significant level of 0.007 (<0.05). This means that perception towards local government creating user online profile positively affects public behaviour intention to adopt and use emerging technologies in local government. Lastly predictor Online tracking is violating my privacy, has a negatively standardised $\beta = -0.035$, t value of -.516, and significant level of 0.606 (>0.05). This shows a that abilities of emerging technologies to track citizens location has a weak influence on impacting the public perception towards emerging technologies safeness, however, we do not have evidence to support that.

5.9 Perceived Complexity

Organisations today, are heavily investing into emerging technologies to improve their performance and gain competitive advantage to their competitors. Automation of business processes has been the main objective behind adopting emerging technologies in both private and public sector. However, the success of integrating emerging technologies into organisation existing business model depends on the user's awareness and interpretation of that digital transformation activity, thus perception.

Some technological innovations are perceived to require more efforts to use than other, hence perceived complexity has been studied by many as a factor that may influence the individual behaviour intention to accept and use emerging technologies. The study by Teo et al (2019) found that technology complexity has a significantly negative influence on the use of emerging technologies. Min, Fung So, and Jeong (2018) echo the similarities between complexity from IDT and ease of use from TAM.

5.9.1 Regression analysis.

Multiple predictors (perceived complexity) were analysed to explain their impact on dependent variable BI. The following is the regression results (model summary, ANOVA and coefficient table).

Table 5.24: perceived complexity Model Summary.

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.464 ^a	.215	.201	2.18315

a. Predictors: (Constant), Mobile payment systems are very complicated and difficult to use. Social media and chatbots platforms are easy to use. Self-serving kiosks are very complex to use.

The model summary shown in table 5.24 shows the results of the regressed dependent variable (BI) and predictor perceived complexity shows the adjusted r square of 0.201, which translate into 20.1.0% of participants behaviour intentions to use and adopt emerging technologies and can be explained by perceived usefulness. This shows a moderate relationship between the dependent (BI) and predictor variable perceived complexity.

Table 5.25: Perceived complexity and BI Anova.

ANOVA^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	368.672	5	73.734	15.471	<.001 ^b
	Residual	1344.046	282	4.766		
	Total	1712.719	287			

a. Dependent Variable: BI

b. Predictors: (Constant), Mobile payment systems are very complicated and difficult to use. Social media and chatbots platforms are easy to use. Self-serving kiosks are very complex to use.

The ANOVA table 5.25 indicates that perceived complexity towards emerging technologies is a positive predictor of citizens intentions to use and adopt emerging technology-based service delivery model, with the F value of (5,282) =15.471, statistically significantly at <.001.

Table 5.26: Perceived Complexity and BI Coefficients.

Coefficients ^a						
Model		Unstandardised Coefficients		Standardised Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	6.050	.827		7.313	<,001
	Mobile payment systems are very complicated and difficult to use.	.860	.178	.307	4.844	<,001
	Social media and chatbots platforms are easy to use.	.068	.168	.026	.405	.686
	Self-serving kiosks are very complex to use.	.674	.189	.242	3.559	<,001

a. Dependent Variable: BI

The coefficient table 5.26 shows the influence of each predictor variable on the dependent relationship. The following are the predictor variables identified: Mobile payment systems are very complicated and difficult to use; social media and chatbots platforms are easy to use; self-serving kiosks are very complex to use.

The results show that predictor variable mobile payment systems are very complicated and difficult to use has a high standardised coefficient $\beta = 0.307$ and t value of 4.844, with the level of significant >0.001 . This means that perception towards mobile payment systems as very complicated and difficult to use has very strong influence on the citizens behaviour intentions to use and adopt emerging technologies systems in local municipality service delivery model, with 30.7% contribution as a predictor of citizens' intention to adopt emerging technologies. Predictor variable social media and chatbots platforms are easy to use show a standardised coefficient $\beta = 0.026$, and t value = 0.405 and significant level of .686 (>0.05). This means that the use of use of social media and chatbots platforms as communication media between households and local municipalities has 2.6% contribution in predicting citizens' intention to adopt emerging technologies. However, there is no significant relationship between less

complexity of social medial platforms and chatbots and individual behaviour intention to use those technologies.

Predictor variable self-serving kiosks are very complex to use has a standardised coefficient $\beta = 0.242$ and t value of 3.559 and level of significant of <0.001 . This means that the negative perception towards self-serving kiosks has 24.2% influence on behaviour intentions to accept and use self-serving kiosks in rural municipalities as a mode of enhancing service delivery and reducing staff workload.

5.10 Perceived Compatibility

Table 5.27: Perceived Compatibility Model Summary

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.317 ^a	.100	.094	2.32528
a. Predictors: (Constant), I prefer to use online platforms, I prefer automated services.				

The model summary shown in table 5.27 shows the regressed results between the predictor variables perceived compatibility (I prefer to use online platforms; I prefer automated services) and dependent variable behaviour intention to use emerging technologies. The regressed results show an Adjusted R Square of 0.094, which translate into 9.4% of behaviour intention which is explained by citizens perceived compatibility.

Table 5.28: Perceived Compatibility Anova.

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	171.742	2	85.871	15.882	<.001 ^b
	Residual	1540.977	285	5.407		
	Total	1712.719	287			
a. Dependent Variable: BI						
b. Predictors: (Constant), I prefer to use online platforms, I prefer automated services.						

The ANOVA^a in Table 5.28, shows an F value of (2,285) =15.882, which is significant with level of significance of <0.001. This shows that our model of fit between predictors (I prefer to use online platforms, I prefer automated services.) and dependent variable (BI).

Table 5.29: Perceived Compatibility and BI Coefficients

Coefficients ^a						
Model		Unstandardised Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	9.025	.602		14.997	<,001
	I prefer to use online platforms	.374	.150	.164	2.495	.013
	I prefer automated services	.437	.145	.198	3.008	.003

a. Dependent Variable: BI

The coefficient Table 5.29 shows that predictor I prefer to use online platforms has a standardised coefficient $\beta= 0.164$, a t value of 2.495 and level of significance of 0.013 which is significant. This means that there is a weak positive relationship between citizens' preference to use mobile platforms to pay service bills and their behaviour intention to adopt emerging technologies, with predictor contributing 16.4% on the relationship. Furthermore, the results show that predictor I prefer automated services has a standardised coefficient $\beta= 0.198$, t value of 3.008, and a significant level of 0.003. This shows that citizens' interest to adopt automated service has an influence of 19.8% on their behaviour intentions to adopt emerging technologies in local municipalities.

5.11 Relationship between model constructs

Table 5.30: Model Constructs correlation.

Correlations		Perceived Compatibility	Safety Perception	Facilitatin g Condition s	Relative Advantag e	Perceived Usefulnes s
Safety Perception	Pearson Correlation	.254**				
	Sig. (2-tailed)	<,001				
	N	288				
Facilitating Conditions	Pearson Correlation	.081	.083			
	Sig. (2-tailed)	.170	.162			
	N	288	288			
Relative advantage	Pearson Correlation	.418**	.430**	-.014		
	Sig. (2-tailed)	<,001	<,001	.818		
	N	288	288	288		
Perceived Complexity	Pearson Correlation	.323**	.345**	-.042	.642**	
	Sig. (2-tailed)	<,001	<,001	.478	<,001	
	N	288	288	288	288	
BI	Pearson Correlation	.316**	.223**	.039	.494**	.392**
	Sig. (2-tailed)	<,001	<,001	.514	<,001	<,001
	N	288	288	288	288	288

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

The correlation table in Table 5.30 reveals that there is positive relationship between citizens intentions to adopt and use emerging technologies and safety perception, with the r value of 0.254 and significance level of <0.001. The results also reveal a weak relationship between behaviour intentions to adopt emerging technologies in local government and facilitating condition, however, there is no significant evidence to support the existence of relationship with the r value of 0.081 and p value of 0.170 (>0.05). Relative advantage and behaviour intentions are positively strongly correlating with the r value of 0.418 and level of significance <0.001. Perceived complexity and behaviour intentions are also strongly correlating with the r value of 0.323 and significant level of <0.001. Lastly, the results show that there is a strong positive relationship between behaviour intentions to adopt emerging technologies and citizens' preferences with the r value of 0.316 and p value of <0.001.

5.12 Model Constructs regression.

Table 5.31: Regression between model constructs.

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.517 ^a	.268	.255	2.10893
a. Predictors: (Constant), PComple, FC, Pcom, SP, RAD				

The model summary in Table 5.31 shows the regressed results that the predictor (Safety Perception, Facilitating Conditions, Relative advantage, Perceived Complexity, and Perceived Compatibility) and the dependent variable Behaviour Intentions to use emerging technologies. The results show the Adjusted R Square of 0.255, which translates into 25.5%. This means that, citizens' behaviour intention to adopt and use emerging technologies can be explained by the predictors (Safety Perception, Facilitating Conditions, Relative advantage, Perceived Complexity, and Perceived Compatibility).

Table 5.32: Table Anova table (model constructs)

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	458.503	5	91.701	20.618	<,001 ^b
	Residual	1254.216	282	4.448		
	Total	1712.719	287			

a. Dependent Variable: BI

b. Predictors: (Constant), PComple, FC, Pcom, SP, RAD

The ANOVA^a Table 5.32 reveals that the model fit with the F value of $(5.282) = 20.618$ and significant level of $<.001$. The level of significance shows that our study model is fit.

Table 5.33: Model Constructs Coefficient.

Coefficients ^a						
Model		Unstandardised Coefficients		Standardised Coefficients		Sig.
		B	Std. Error	Beta	t	
1	(Constant)	4.136	.927		4.461	<,001
	Pcom	.157	.073	.122	2.157	.032
	SP	-.008	.037	-.013	-.223	.824
	FC	.051	.066	.040	.773	.440
	RAD	.179	.035	.372	5.167	<,001
	PComple	.089	.050	.119	1.778	.076

a. Dependent Variable: BI

The coefficient Table 5.33 explains the impact of each predictor variable (Safety Perception, Facilitating Conditions, Relative advantage, Perceived complexity, and Perceived Compatibility) on the dependent variable Behaviour Intentions to adopt emerging technologies in local government. The following are the results of the regressed results. Predictor variable

Safety Perception has a $\beta = -0.013$, t value of -0.223 and level of significance of 0.824 . Predictor relative advantage (RA) has a $\beta = 0.372$, t value of 5.167 and significance level of <0.001 . Our results show that citizens believe that emerging technologies will offer more benefits compared to the traditional methods of engaging the citizens and has significant impact on their behaviour intention to adopt emerging technologies for their interaction with local government, contributing 37.2% on the relationship. Predictor variable perceived usefulness has a $\beta = 0.119$, t value of 1.778 and significance level of $=0.076$. This means the abilities to easily manage users' local municipalities account and quickly perform payment, download their service documents without cashier involvement has a moderate impact on the public perception towards emerging technology-based service delivery model contributing 20.9% on their relationship between the independent variable (perceived complexity) and dependent variable behaviour intention. Lastly, Safety perception has a $\beta = 0.068$, t value 2.104 and significance level of 0.036 . This means that secureness, privacy, and trust have an influence on the public perception towards emerging technology-based service delivery model, contributing 6.8% of the relationship with the independent variable (safety perception) and the dependent variable.

5.13 Structured Equation Model

The researcher went further to go beyond ordinary regression models to incorporate multiple independent and dependent variables and hypothetical latent constructs that clusters of observed variables might represent, by adopting as structured equation model (SEM), as indicated by Savalei and Bentler, 2006. The three most used fit indices Comparative Fit Index (CFI), Tucker-Lewies Index (TLI), and (RMSEA) confirmed the fitness of the study model.

5.13.1 Confirmatory Factor Analysis

Conceptualised models are developed from theory/ theories that s underpins the study, and they are made up of constructs that measure participants' behaviour in line with the topic under study. In construct development, the hypothesis is that there is a relationship between observed variable and latent variable. The confirmatory factor analysis gave us an opportunity to test the null hypothesis that there is a relationship between the observed variables and the latent variables.

To test the relationship between the observed variables and latent constructs, the researcher conducted a confirmatory factor analysis (CFA) using AMOS. This allowed the researcher to test the hypothesis that there is an existing relationship between variables and latent constructs, as indicated by Diana (2006). The study shows that our model was fit to continue with further analysis, the RAMSEA $=0.031$, CFI 0.992 , and NFI $= 0.964$, as shown in Table 5-34.

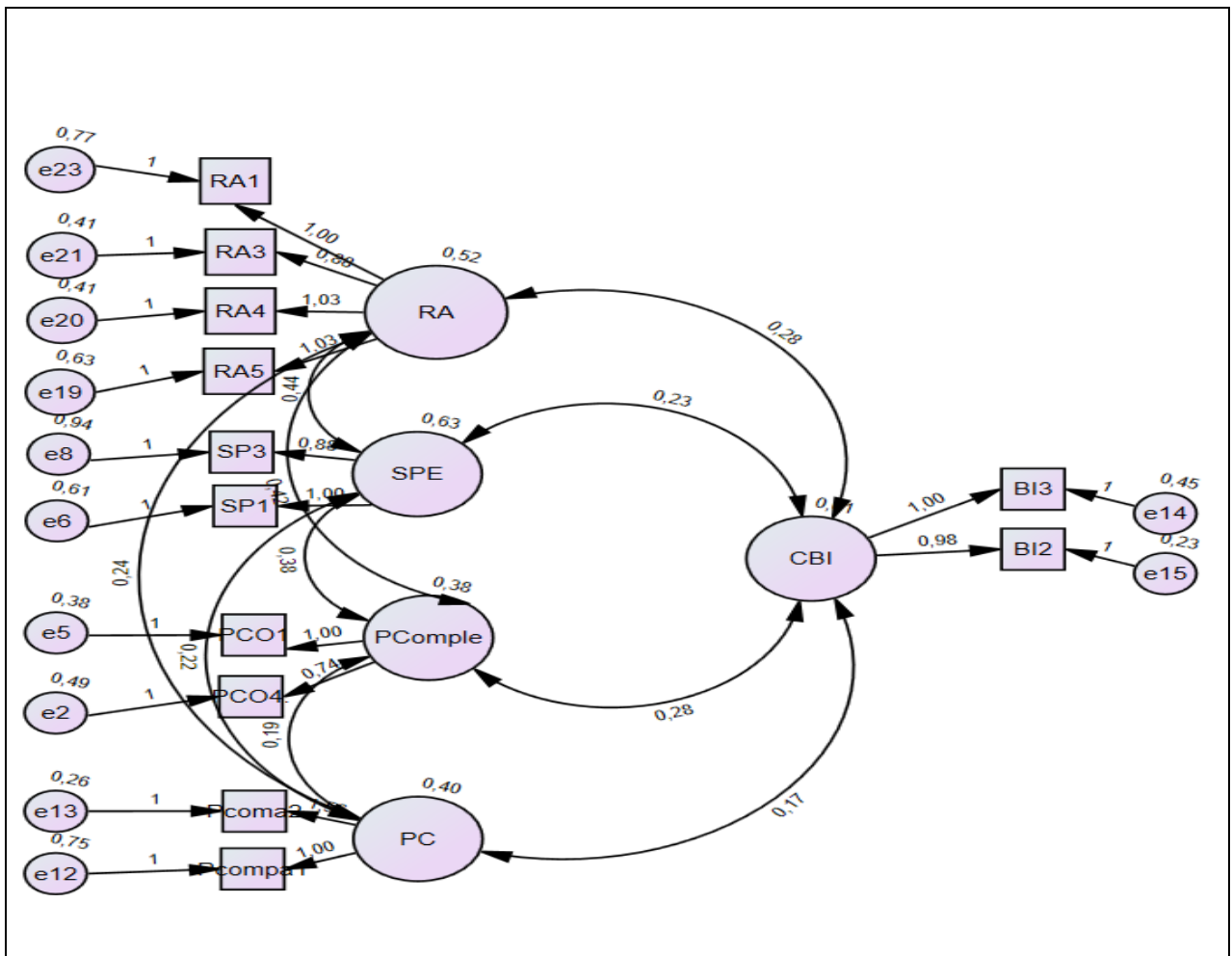


Figure 5- 3: Confirmatory Factor Analysis.

Confirmatory factor analysis was conducted to confirm the factor structure of our study. Figure 5-3 shows the output of our analysis. According to Alagele, et al (1997) there are different indicators to test the model fitness of the CFA. According to Surh the Chi-square should be closer to 0, and the probability level should be ≥ 0.05 . RMSEA which according to Hooper, Coughlan, and Mullen (2008) tells us how well the model, with unknown but optimally chosen parameter estimates would fit the populations covariance matrix. This fit index has seen a continuous changes on the acceptable cut-offs, however, a cut-off of closer to 0.6 seem to be a generally accepted range as indicated by Hooper. CFI, NNI, and NFI (0.9420) values should be (0.90 or larger) for acceptable model fit. This was also supported by Alagele (1997), who indicated that for the model to be considered fit the CFI should be $\geq .95$, whereas Suhr, suggested that it should be .90 and higher.

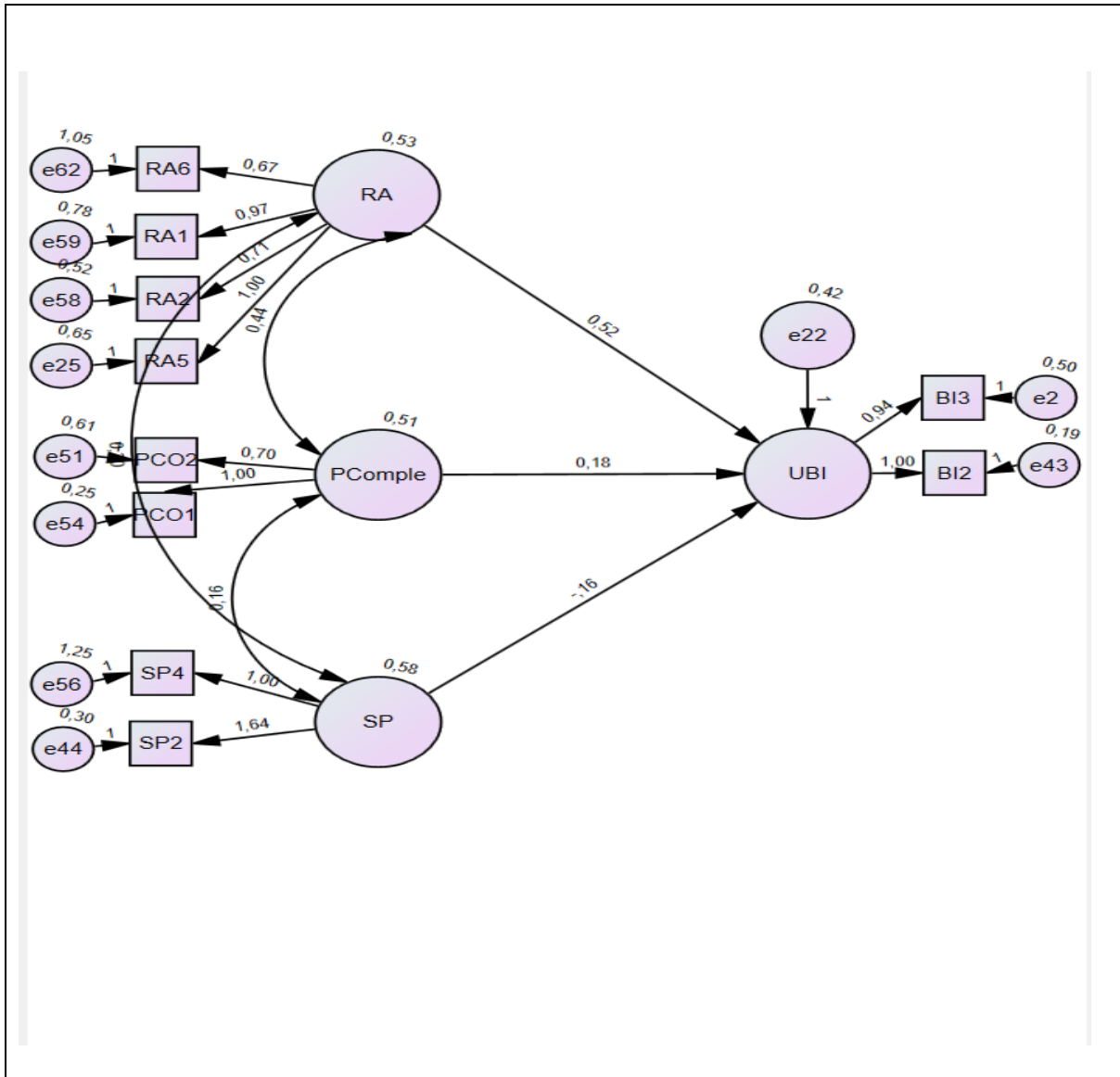


Figure 5- 4: Structured Equation Model for the study.

The Structured Equation Model (SEM) study shown in Figure 5-4 is considered fit if it obtains a very low chi-square, which according to Dion (2008) is given by χ^2/DF and is used to measure the difference between the actual relationship in a sample and the expectancy if the model is correct. However, most used fit indices are Comparative Fit Index (CFI) which cut off $\geq .95$, and considered perfect if greater than .095, the Tucker-Lewies Index (TLI), which cut off at $\geq .95$ and Root mean square error of approximation (RMSEA), which is considered fit lower at $< .05$. Our study shows a chi-square of 1.58 which meets the required level of < 1 or 2 , with a p value of 0.02. Furthermore, our study shows the CFI of .971 and IFI of .972. The study also shows a RMSEA of .045 meeting a close fit of $< .05$. The study also shows a NFI of .927 which according to Karayaka-Ozyer and Aksu-Dunya (2018); Smith and McMillan (2001), meets the acceptable fit of $\geq .90$.

5.14 Comparison of the study CFA and SEM,

The Table 5.34 shows the comparison between the study confirmatory factor analysis and the study structured equation model confirming citizens perception towards integrations of emerging technology into rural municipalities business model.

Table 5.34: Confirmatory factor and SEM Fit Indices.

Assessment Fit	CFA	SEM
X		63,3
Degrees of Freedom	25	29
Probability level	0,163	0,000
CMIN/DF	1,273	2,183
NFI	0.964	0.914
GFI	0.935	0.959
TLI	0.985	0.923
IFI	0.992	0.952
CFI	0,992	0.951
RAMSEA	0,031	0,064

Table 5.35: Hypothesis Testing through regression weight extracted from the IBM SPSS Amos.

			Estimate	S.E.	C.R.	P	Label
UBI	<---	RA	,521	,239	2,178	,029	par_2
UBI	<---	SP	-,158	,077	-2,065	,039	par_3
UBI	<---	PComple	,178	,231	,773	,439	par_6
BI3	<---	UBI	,941	,118	7,987	***	par_1
RA5	<---	RA	1,000				
BI2	<---	UBI	1,000				

			Estimate	S.E.	C.R.	P	Label
SP2	<---	SP	1,641	,462	3,551	***	par_4
PCO2	<---	PComple	,704	,097	7,254	***	par_5
PCO1	<---	PComple	1,000				
SP4	<---	SP	1,000				
RA2	<---	RA	,712	,089	7,979	***	par_7
RA1	<---	RA	,970	,115	8,416	***	par_8
RA6	<---	RA	,667	,109	6,131	***	par_9

The proposed hypotheses result were tested, and the study shows the following results. The results are shown and extracted from the Table 5.35.

Perceived Safety

H1: Citizens' perceived safety will negatively affect their behaviour intentions to use emerging technologies (SP).

The regression weight shown in Table 5.35 shows a negative relationship between citizens perceived safety and behaviour intention to adopt emerging technologies with the C.R value of -2.065 and p value of 0.039 which is significant. Therefore, the null hypothesis is accepted. The findings of this study are in line with the findings by Almaiah & Al Mulhem, 2018, who discovered that security issues are major concerns in the users' intentions to adopt and use emerging technologies.

Relative Advantage.

H3: The benefits associated with emerging technologies influences citizens behaviour intentions to adopt emerging technologies in rural municipalities.

The regression weight table in Table 5.35 shows a positive relationship between relative advantage and behaviour intention to adopt emerging technologies with the C.R value of 2.178 and p value of 0.029 which is significant. Therefore, the null hypothesis is accepted. The study results are in accordance with the findings by Almaiah & Al Mulhem, 2018; Ullah et al, 2020 who discovered that the benefits associated with the use of emerging technologies are affects individuals' behaviour to adopt emerging technologies such as mobile applications.

Perceived Complexity.

H4: Citizens perceived complexity of emerging technologies will negatively affect their behaviour intentions to use emerging technologies on digitalised municipalities business model.

The regression weight table in Table 5.35 shows a weak positive relationship between perceived complexity and behaviour intention to adopt emerging technologies with the C.R value of 0.773 and p value of 0.439 which is not significant. Therefore, the null hypothesis is rejected.

The structured equation model of the study could not discover any relationship between construct perceived complexity and behaviour intention to use emerging technologies. This differs to the findings by Tahar et al, 2020, who discovered that ease or less complex to use can significantly affects user intentions to adopt emerging technologies such as e-filing. This result shows that emerging technologies systems and application simplicity and ease of use will have less impact on citizens behaviour to use. Previous studies have discovered an advance in adoption of online based applications and this study also confirms that, however, the improve in use of online applications and other technological innovation have no direct or indirect impact on citizens intention to adopt local municipality emerging technologies-based business model.

Perceived Compatibility

H2: The study failed to discover significant evidence to support that adoption of emerging technologies in local municipalities is compatible with their needs., and thus positively affect their behaviour intention to adopt. The findings of this study differ to the findings by Schmidhuber, Maresch, & Ginner, 2020; Ullah et al, 2020, who both discovered that individual believes that emerging technologies driven business models is aligned to their needs, values and experience, and as a result it positively affects their behaviour intention to adopt. There has been growing demand for local municipalities and other spheres of government agencies to reconfigure their business model through the adoption of emerging technologies. However, the study results means that rural citizens and rural municipalities interest on online platforms does not reflect their behaviour intentions to adopt an emerging technology driven business model.

Facilitating Conditions

H5: This study, failed to generate enough evidence to support that lack of supporting facilities to facilitate adoption of emerging technologie innovations have a direct impact on the

behaviour intention to adopt emerging technologies driven business model. The study results are aligned to the findings by Tam, Santos & Oliveira, 2018, who discovered that facilitating conditions are not an important factor in explaining users' continuous behaviour intention to use emerging technologies. The study finds that perceived safety has been discovered as a major factor affecting the adoption of technology innovations, thus even though citizens in rural communities have the right knowledge and skills as discovered on this study, they may find it difficult to accept emerging technologies driven business model in local municipalities. This is due to other factors such as security and privacy issues characterised internet-based applications.

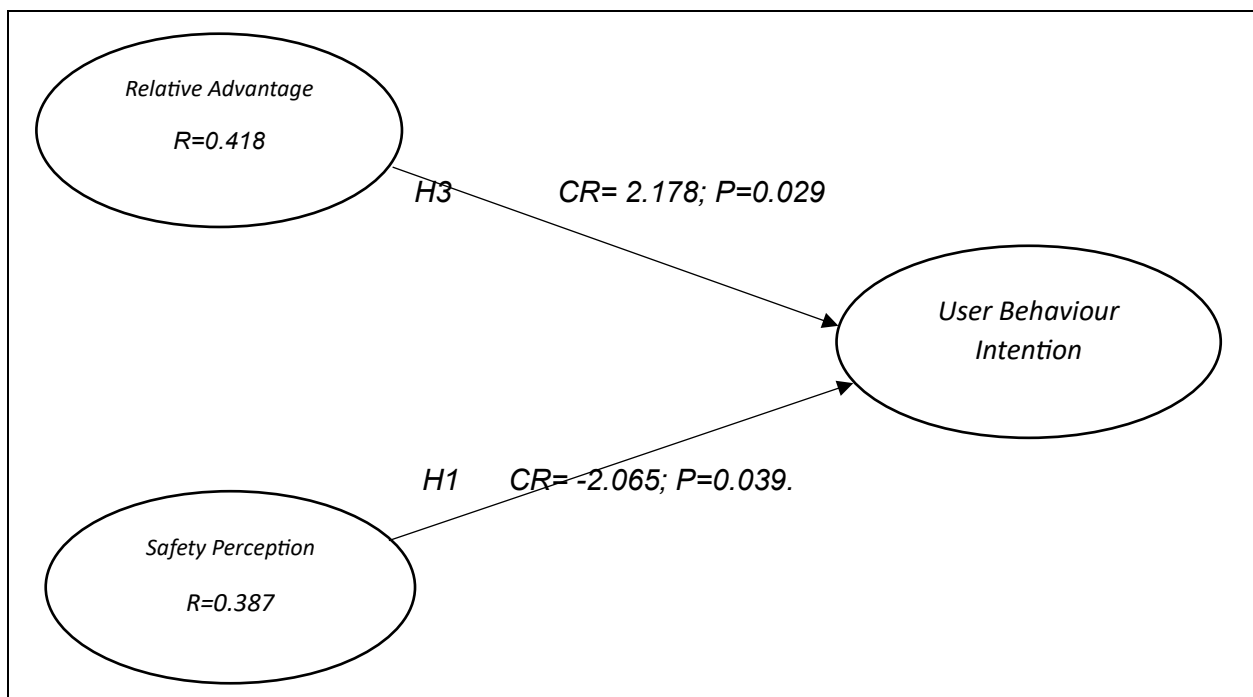


Figure 5- 5: Model for citizens perception towards rural municipalities digital transformation.

A structure equation model results in Figure 5-5 shows a strong positive relationship between relative advantage and behaviour intention with the R value of 0.418 and p value of 0.029 which is significant. This shows that relative advantage is a determinant of behaviour intention, thus citizens are willing to adopt emerging technologies driven business model due to the potential advantages associated with emerging technologies such as chatbot, artificial intelligence sensors and drones. Furthermore, it also managed to establish the negative relationship between safety perception and behaviour intention to adopt emerging technologies with the R value =0.387 and p value of 0.039. This shows that even though participants perceived emerging technologies potential beneficial, safeness when using emerging technologies is still an issue.

5.15 Chapter summary

The chapter observed the sample distribution normality using skewness and kurtosis and furthers discuss demographic profile of the study mainly focusing of participants age, gender, level of education and information literacy on descriptive analysis. Relationship between variable and constructs were identified through corelation and regression on SPSS. Factor analysis and confirmatory analysis were analysed to confirm the study factor loading. Study hypotheses were tested and confirmed using AMOS.

6 CHAPTER SIX: QUALITATIVE DATA ANALYSIS

6.1 Introduction

A mixed method approach enables researchers to combine two approaches (quantitative and qualitative) under one study, thus two data sets. The previous chapter gave a detailed quantitative result of the study. However, the following chapter gives a detailed analysis of qualitative study results, exploring how rural municipalities departmental managers in rural area perceive the integration of emerging technologies into municipalities' service delivery business model. This chapter further intended to explore the challenges faced by rural municipalities in adopting an emerging-driven service delivery model. A thematic analysis process by Clarke and Braun (2015) was used to discover themes and sub-themes related to already established study research questions using Atlas.ti 8.

6.2 Thematic analysis.

Thematic analysis is the most used technique in qualitative research, which involves detecting, analysing, and reporting themes from data (Javadi & Zarea, 2016). Hence, to attain meaningful and valuable results, the researcher must conduct thorough and methodical processes for the results to be accepted as trustworthy (Nowell et al., 2017). Thematic analysis is a procedure that systematically generates codes and themes from qualitative data, and its main goal is to identify and interpret key themes that emerged, but not necessarily all, features of the data, guided by the research question. (Clarke and Braun, 2015). Clarke and Braun (2015) further indicated that codes are the building blocks for themes, which are patterns of meaning underpinned by a central organising concept, a shared core idea.

6.2.1 Inductive thematic analysis

This study adopts an inductive thematic data analysis, meaning that the study's themes were extracted from the data. According to Braun and Clark (2015), inductive thematic analysis enabled the researcher to detect the underlying meaning of data sets. The researcher adopted the thematic approach proposed by Braun and Clarke (2015), which comprised six phases. The first phase involved transcribing from audio into a Word document; by doing so, the researcher managed to get familiar with the data before the actual familiarisation stage. The researcher further involved in rigorous reading of transcribed documents to better understand data before starting coding. This includes spelling checks and other grammatical errors that may change the content's meaning. The second phase involved initial code generation as

shown in Figure 6-1. The researcher identified key features aligned with the study objectives in this phase. Thus, the researcher was guided by the study's established research question when identifying the codes. In this stage, multiple codes were identified. The third phase involved combining related codes in searching for themes. In this phase, codes that closely shared the meaning were combined to form categories; thus, possible themes started to form. In the next phase (phase four), the potential themes emanating from the third phase were reviewed. This involves reviewing the alignment of potential themes with the study objectives. The researcher generates and refines themes in the next phase, phase five. This phase involved giving clear names to the theme. This is also a vital phase, as the names should be aligned with the topic under study. The last phase involved producing a report, which produced main quotes for each theme (see Annexure 1)

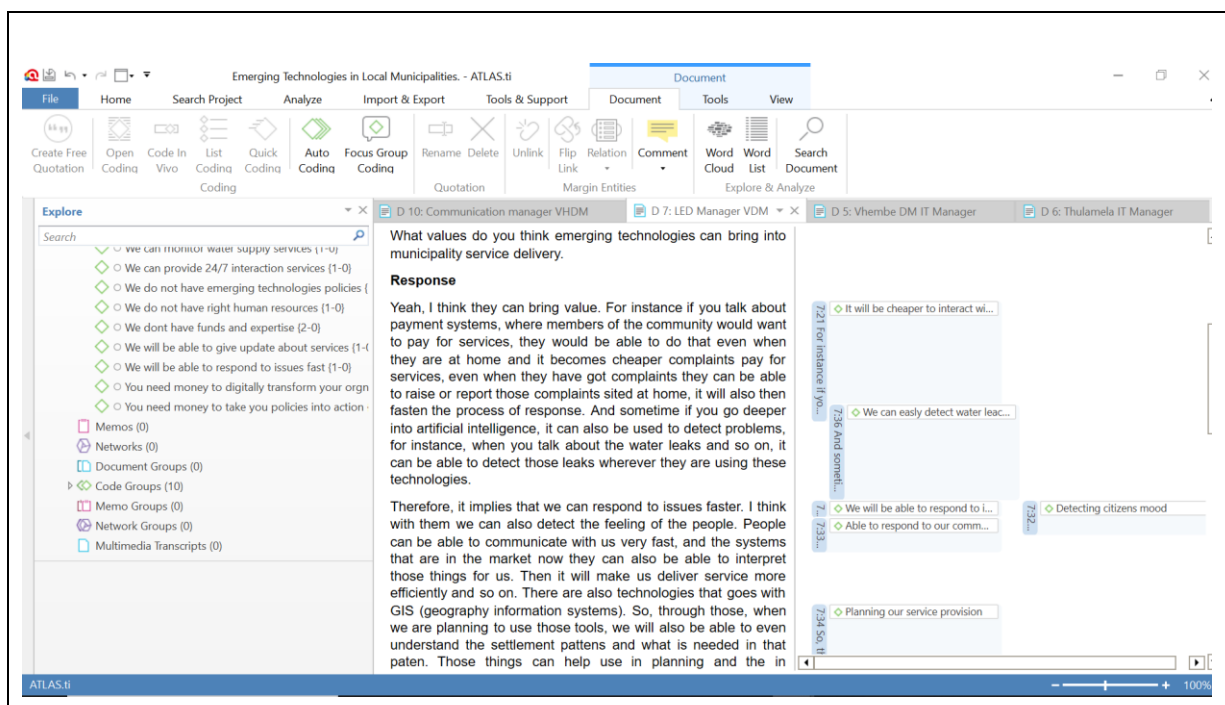


Figure 6- 1: Illustration of initial code generation.

2.1.1.1 Categories and theme defining.

The third phase involved identifying relationships between codes to create a dataset. Multiple codes sharing the same meaning under the investigated concept collapsed into a single category. In this phase, five (5) categories were detected and identified: Emerging technologies illiterate, Enhancing municipalities' performances, Government-Citizens Instant Interaction, resource availability, and Unclear implementation plan.

The transcribed interview generated themes and sub-themes (Enhancing government-citizens interaction, Enhance the quality-of-service provision, Deficiency of digital transformation expertise and digital illiteracy, Research, collaboration, Inadequate funding and emerging

technologies Infrastructure, Unsupportive policies, Historical background, and politics). Themes and sub-themes will be discussed thoroughly in this chapter.

6.3 Qualitative Findings.

The study objectives were to explore how departmental managers in rural municipalities perceive the integration of emerging technologies into the municipality's service delivery model. Furthermore, the study intends to discover the challenges faced by managers in rural municipalities in transforming their business models by adopting emerging technologies. Two major themes were discovered from the thematic analysis conducted: government-citizen interaction and enhanced municipalities' performance. Each theme is discussed below.

6.3.1 Enhance interactions between government-citizens.

The participants indicated that integrating emerging technologies into municipalities' business models will enhance their interaction with the communities due to emerging technologies' abilities' ability to receive and respond to queries instantly. Artificial intelligence applications, such as chatbots, WhatsApp and Facebook, MS Teams, Zoom, etc., can create seamless government-citizens interaction remotely, such as communications, alerts or notifications, payment of bills, and accessing files and documents while citizens are anywhere.

Furthermore, adopting emerging technologies also reduces costs when interacting with municipalities, and some participants also believe that adopting emerging technologies in municipalities will reduce costs for citizens incurred when interacting with them. Mobile payment systems will reduce traveling costs as citizens will be able to pay for their services bill virtually, limiting all traveling, and by doing so, they will be saving costs as expressed by participants one and two below:

“Technology is the best way to go. However, there is an element I do not know whether it should be something on the artificial intelligence level because you would want that when you are putting or punching any information into your cell phone wherever you are sitting, you get an immediate response because without that then all, it is valueless and people who want something visible that is actioned and is working. If we manage to get solutions for AI, we will be able to have proper and better citizen-government interaction.” (P1).

“For instance, if you talk about payment systems, where members of the community would want to pay for services, they would be able to do that even when they are at home, and it becomes cheaper complaints pay for services, even when they have got complaints they can

be able to raise or report those complaints sited at home, it will also then hasten the process of response." (P3)

The participants also indicated that adopting emerging technologies in municipalities' business models in rural communities will enhance government interaction between government and citizens by enabling the community and other stakeholders to participate in government activities such as planning and IDP engagements. This result shows that departmental managers in local municipalities believe that integrating emerging technologies into local municipalities business model will offer more benefits to off-the-counter business mode currently adopted in rural municipalities of South Africa. The qualitative results are in accordance with the quantitative results strand as citizens believes that adoption of emerging technologies into local municipalities business model will offer more benefits to them than the current methods of operating. The study findings echo the findings by Noordt & Misuraca, 2022, who indicated that Artificial Intelligence tools such as chatbots in public sectors are found to be enhancing provision of information to the citizens.

6.3.2 Enhancing community and stakeholder government participation.

Most participants perceived emerging technologies as a component that will enable changes in the municipality. These technologies have the capabilities and potential to change how they respond to their stakeholders, get people and other stakeholders involved in IDP, plan projects, and report back to the communities about the ongoing municipality projects. The current municipality business model requires government authorities to physically travel to villages to conduct community-government meetings. However, advancements that are taking place in the use of virtual platforms such as MS Teams and ZOOM are excluding community members. This means municipalities are now adopting technologies to engage with other internal stakeholders but exclude community members. This was also raised by some participants who indicated that they are benefiting from using emerging technologies to engage virtually. IDPs are participatory activities requiring input from citizens and internal and external stakeholders, and they are a significant component of democratic governance.

Some participants indicated that adopting emerging technologies paves the way for virtual meetings with communities and other stakeholders. These technological changes have seen municipalities moving from paper-based communication to quick and secure communication and filing. Using dynamic websites, municipalities can move away from newspaper and radio advertising into a more dynamic platform that offer immediate interaction between the municipalities and stakeholders.

"It should change how we are doing things in a sense that it must change how we respond as a municipality to the issues in communities. How are we doing with our IDP? How we are

preparing our budgets. How we communicate back towards communities regarding preparing our IDP, our budgets, how we are implementing our projects, and how they must interact with us regarding responding to those projects. Because now, if we can investigate how we're doing our budgets, IDPs, and projects, all these are just being done manually. Nevertheless, if we adopt various technologies, the communities will know that this is our time to prepare our budgets. We will also be able to get them to participate in different activities that need their input, the right information we need, we can end preparing our IDPs without even going to the communities but using various available technologies". (P4)

"Even our stakeholders who are outside these committees participate in that committee remotely. It is not like in the past when we relied on paper communications. These technologies are good and make it quick for us to communicate with stakeholders. It is also good for securing our files. We interact with our stakeholders using these technologies, especially those relying on government services. Hence, even our adverts go on through technologies, and people can see videos as evidence" (p5).

Furthermore, participants indicated that integrating emerging technologies into municipalities' service delivery model will enhance government communication, thus enhancing interaction between government and citizens. Communication between government and citizens is vital to the development of democratic government.

6.3.3 Enhance government communications.

Emerging technologies can deliver continuous communication without human intervention. This was also mentioned by one of the study participants. Embedding intelligence chatbots and establishing social media platforms such as WhatsApp will allow municipalities in rural communities to capture queries, concerns, and other issues related to government instantly without human involvement. Technologies do not sleep or get tired, as was also mentioned by one of the study participants. Therefore, a technology-based channel for capturing information automatically will lessen citizens' frustration and further improve the municipality's reputation due to the ability to respond immediately. To offer seamless communication services, municipalities must rely on human beings, ignoring all the potential benefits of automation, which are not restricted by time and geographical distance. However, adopting a technologically based model will allow the municipalities to offer 24-hour service accessibility. Thus, citizens can report issues as soon as they occur or are needed and guaranteed positive responses instantly.

"Yes, there are challenges because even with those mobile solutions, you are texting on Facebook at 3:00 AM, and by that time, I am probably the one who is supposed to respond, but I am sleeping. There is no reply, not even a message of acknowledgment to show that

your message has been received and we will get back to you; that little interaction is not there. This means you are still frustrated wherever you are, and then you will start to say what? There is no service” (P4).

Those are realities because if you cut off the issue of AI, you must have human resources to have a 24-hour manual service. (P4)

When someone hits a pothole in some space, they will be comforted to say no. You know what? Do not worry. That photo has been reported already. We are coming to work on it tomorrow. Something of that nature to comfort that person or something of that nature.” (P2)

Communication in democratic governance is one critical element. With the aid of intelligent technologies, municipalities can provide government-citizen communication systems. This platform will enable citizens to communicate with municipalities any time or any day they want, as indicated by Participant 4. Other participants indicated that using the right technologies, such as predictive analytics tools and expert systems, would be easy for the government to establish fast communication, detect moods in communities, and respond to community issues.

Suppose we want to be an intelligent municipality. We can be an innovative municipality by providing people with the systems that will enable them to have access to the data, to have access to the systems that are going to enable them to say on a day-to-day basis I can be able to communicate with the municipality using the data or I can go to this platform with this platform I'll be able to talk to the municipality and the municipality will be able to respond. (P4).

“Therefore, it implies that we can respond to issues faster. I think with them, we can also detect people's feelings. People can communicate with us very fast”. (P3).

Using emerging technologies such as WhatsApp, we can easily update our citizens about outages on basic service supply systems, cautioning people about the service outages. Musina municipality has adopted this, connecting communities and stakeholders on one platform, making it easier for the government to distribute important information about government events at a lower cost.

“As a district municipality, if we have a social media platform that updates people about everything related to government, we can engage with our people through that platform, giving them important information and updates like water shortage, sewer leakage, and everything. Musina has a WhatsApp group for all the stakeholders, where information about government events like Imbizo is distributed. These platforms are quick and cheap”. (P5)

The study discovered that participants perceived integrating emerging technologies into municipalities enhances the municipality's performance. Municipalities are judged on their performances in delivering basic services to the citizens within their demarcated areas.

6.4 Enhancing municipality's performances

In the South African context, basic services are constitutional rights. Thus, through municipalities, the government is compelled to deliver essential services such as water, electricity, housing, sewage systems, and garbage collection to the communities. The world continuously evolves into the digital era, where technologies are now conceptualized for solving community problems. This is a trend that is overlapping from the private sector into government and governance, a step aiming to enhance the quality-of-service provision. The study qualitative strand suggests that managers in rural local municipalities believes that emerging technologies potential abilities are aligned to their needs. To enhance service delivery performance, local municipalities need to monitor and control service delivery platforms, detecting and understanding the needs of their customers better. However, quantitative could not confirm perceived compatibility as a determinant factor which can affects their behaviour intention to adopt emerging technologies driven service delivery model. The difference between the two strands suggest that citizens are more concerned about receiving services, and on the other side managers are more concerned about on how they are delivery service to the communities. The Figure 6-2 gives a clear illustration of theme "Enhancing municipalities performance."

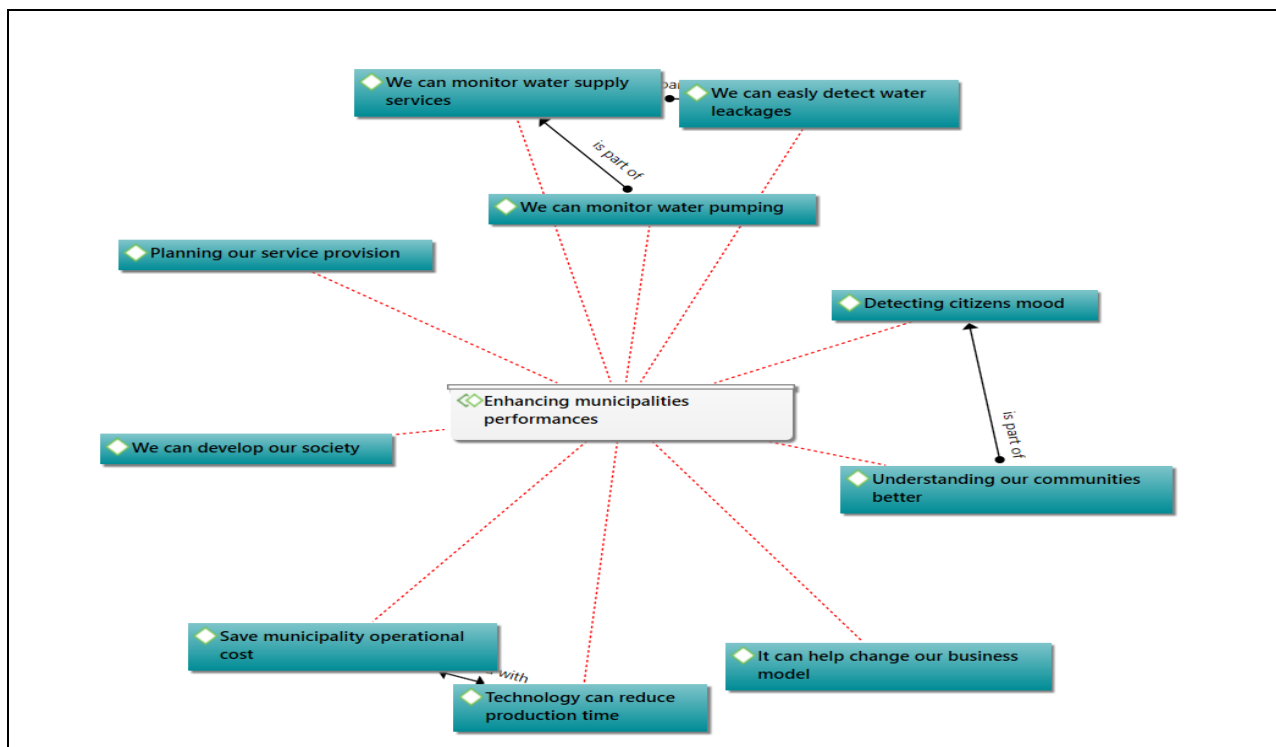


Figure 6- 2: *Enhancing municipalities performance Network.*

6.4.1 Enhance the quality-of-service delivery.

As mandated by the constitution, municipalities are required to deliver quality services to the communities. Some participants indicated that adopting emerging technologies in municipalities will improve the quality of services delivered to the rural communities, thus enhancing the quality-of-service delivery by municipalities, which is a key fundamental aspect of the South African constitution 1994.

Participants in this study indicated that, with the right ICT infrastructure, it will become easier for them to virtually monitor and identify the areas that need services. Thus, it will allow municipalities to prioritise service needs and further enhance their plans. Furthermore, it will allow municipalities to understand their communities better; thus, they can deliver services aligned with the community's needs. Some areas in rural communities are prone to natural disasters such as floods and strong winds, and as a result, some of the basic services supply systems infrastructure, such as roads, water pipelines, sewage pipelines, and electricity lines, may be damaged. Therefore, integrating emerging technologies in municipalities will allow municipalities to use drone technologies with the ability to capture live images of the state of infrastructural damage before deploying service agents. Thus, allowing municipalities to respond to matters early and enabling them to respond quickly and accurately.

“We are creating our own Thulamela application as a Thulamela municipality that will enable us to communicate with our clients or citizens. We will be able to gather data about what is happening in the outskirts of the hoodoos, in the villages, out there where there are issues,

whether in roads or potholes, trees that fell last night or whatever, a quick reporting tool with the GPS coordinates, to make it easier for our service agents to reach the affected areas”. **(P2).**

Delays and incompleteness have characterised municipal projects, which has continuously damaged the relationship between citizens and municipalities and their reputation; however, some participants believe that adopting and using emerging technologies as a value proposition component in the value delivery model will help municipalities reduce backlogs and delays and enhance successful delivery of projects. Using artificial bricklaying technologies, a water reservoir building project can take less time to complete than it currently takes municipalities to complete. Thus, the early completion of a reservoir means an enhancement in municipalities' capabilities to provide water to the communities in rural communities.

The municipality needs to clearly understand how their communities and villages are structured. This is very important in planning service delivery. Some participants indicated that, when adopting emerging technologies, municipalities can enhance their planning on the delivery of services. For municipalities to deliver clean water, electricity, roads, and other essential services, they need to have the right information about how they will provide that and what amount is required. This always plays an important role in the allocation of resources. The evolution in ICT has resulted in drones with the potential to capture high-quality images and further submit valuable information to the owner. Thus, in municipalities, using drones will allow municipalities to understand the patterns of villages. Most villages established before the democratic state in South Africa are not formally planned. Therefore, it is difficult for municipalities to deliver water and sewage pipes and develop the area due to a lack of clear plans. Municipalities can improve their performance by adopting emerging technologies as part of their strategic plan. Programs and projects require documented plans; therefore, to come up with the budget or schedule for the project, there must be detailed information about the intended village.

“These emerging technologies can improve in terms of service delivery. So, let me give a practical example of this new technology, including 3D. So, if you are to build a reservoir, it takes the municipality 24 months, but when using the three 3D technologies, you can build a reservoir within a week rather than within 24 months. This means that you can automatically deliver on time, thus improving the issue of service delivery. So, if you are saying 24 months, you cut it into a week, which means automatically the other remaining 11 months, you can focus on other projects”. **(P1)**

“So, when we plan to use those tools, we will also be able to understand the settlement patterns and what is needed in that pattern. Those things can help us plan and implement programs and projects. So that is why I am saying they have a good value”. (P3)

Cloud computing offers users easy access and secure information storage to potential users, according to some of the study participants. Therefore, adopting cloud computing technologies in government will give them the privilege to work remotely without carrying out large amounts of paper. Cloud services can potentially allow storage, sharing, and retrieval of information. Therefore, colleagues can manage their information or municipalities' information at a lower cost. Evidence about certain municipalities can be easily captured and accessed by relevant people. With information available, municipalities can improve their performances as they can easily be retrieved and analysed, and they can make informed decisions quickly.

“When you talk about cloud systems, we can record what we do daily in a government communication system and store that in the cloud. In Government communication, we have got a system where you can record the information. When you are conducting your work or research, others will also be able to view what you are doing remotely, so when you come back, you will have everything already captured in your system. You can also forward this to others to show that I'm from this area; I have been conducting research, and this is my POE. So, the recent technologies are clear; they've got clearer evidence than we were using before, and they save cost again”. (P5)

6.4.2 Monitoring and controlling services supply systems.

Advanced technologies, such as artificial intelligence, can detect problems associated with service supply systems. Planted on the water pipes, artificial intelligence sensors can detect water leakages, which might negatively impact the water supply to the communities. Participant One believes that people who have adopted these technologies benefit from them. In addition to water supply systems, participant 3 indicated the need to monitor service delivery supply systems for municipalities to save production costs. Installing intelligence on water pumping systems and reservoirs may benefit municipalities as these technologies will detect when to switch on the water pumping machine and when to switch it off, hence perceived value. An intelligent, controlled water supply system will benefit communities and municipalities because municipalities can avoid water outages due to constant monitoring. Furthermore, one of the study participants raised the issue of monitoring water supply systems, who indicated that municipalities would benefit from emerging technologies as they can monitor and report on areas affected by water shortages.

“And sometimes, if you go deeper into artificial intelligence, it can also be used to detect problems, for instance, when you talk about the water leaks, and so on, it can detect those leaks wherever they are using these technologies.” (P1)

“Yes, 100%, can add value 100%. I will use the same example if you say you will have artificial intelligence, the Internet of Things, or something on the reservoir. Which means you will check the water loss. The water loss is money, so automatically, if you curb that water loss, then you are saving a lot of money for the municipality. It tells you can do other projects impacting the community. That's what I'll do. Say it will; it will be 100% valued”. (P3).

“Government can also benefit using the emerging technologies by easily zooming where there are pipelines and get the area where there is water and area without water.” (P5)

6.5 Challenges on municipality adoption of emerging technologies.

The study further intended to investigate the challenges municipalities face in integrating emerging technologies into their service delivery model. The study's thematic analysis led to the discovery of three major themes (Emerging technologies illiteracy, deficiency of digital transformation expertise and resources, and deficiency of external associates) and supporting sub-themes. Themes and sub-themes are discussed below.

Emerging technologies illiteracy- Lack of knowledge, skills, understanding, awareness, and training emerged as some of the major challenges municipalities face in adopting emerging technologies.

6.5.1 Lack of emerging technologies awareness and training

The participants indicated that lack of awareness and training on emerging technologies is one of the challenges within emerging technologies. Some participants highlighted the issue of awareness and knowledge of the existence of these emerging technologies, how they function, and how municipalities and society can benefit from them. Municipalities may be very difficult and challenging to digitally transform their business model without knowledge of existence and proper training. The variation in age groups within the organisation also determines the need for training and awareness campaigns to reduce the digital divide gap. Organisational strategies are antecedents of digital transformation initiatives in organisations; therefore, proper understanding, knowledge, and awareness are the keys for an organisation to adopt new technologies or integrate them as part of its strategic objectives.

Digital literacy is not limited to having basic skills and the ability to use a computerised device; it also involves being technologically innovative and changing perceptions towards those technologies. Lack of awareness and training on emerging technologies impedes rural

municipalities from digitally transforming their business model into an emerging technology-based business model. In addition, some participants highlighted the need to get trained and develop the necessary skills aligned to emerging technologies, which shows that their primary challenge is the lack of training aligned to emerging technologies. One participant reacted to what transpired during the launch of Science and Innovation Week, which took place at the University of Venda in 2023, and his observation when Professor Marwala was presenting about emerging technologies tells the story that most people are unaware of what emerging technologies such as artificial intelligence can achieve.

One of the study participants believes that as part of digital transformation in municipalities, young staff must be trained and equipped with the right technological skills, not limited to basic computer skills. However, single-pick young staff members in municipalities as targets in skills development programs confirms digital exclusions of older people in the information society, which is also the reason for lagging in digital transformation in municipalities.

"I think the first thing is awareness, to make people aware of the existence of technologies and the use and the ease with which they will be able to do their work, and that is for both the Municipal officials and their society at large, the major thing is awareness. Then what should follow also is training. Of the officials and members of the community so that they can use those technologies. Maybe this is also an issue of training. That may not be there. It's also an impediment for municipal officials. So, if we do that, we can take advantage of those technologies. The major thing is awareness and training". (P3).

"There is progress, but one can say we are still far behind other advanced countries; even as government officials, there is a budget for skill development, and there is a department that deals with capacity building, be it in local government or district officials, will be able to get an opportunity to go and advance. As part of it, young people need skills, not like basic computer skills, but advanced computer skills". (P5)

"On the day Prof Marwalwa was presenting about emerging technology at the University of Venda, one could see through audience reaction that he was like talking alone, the reason being, the concept he was presenting about was like new to most of his audience, but the concept was not new to the world." (P1).

Some study participants indicated the need for more knowledge about these technologies and the lack of technological innovation, which translates into emerging technologies in illiterate municipalities; hence, digital transformation is moving at a slower rate. Furthermore, participants believe that some of the staff members and councillors need to gain knowledge

and understanding of emerging technologies, and they need to be capacitated or have the right partners with the right skills to respond to technological changes.

“Another cause of the delay is that people who need to give a green light to approve the implementation must understand. There is an issue: only some municipality members know these technologies. Knowledge about the existence of those technologies, and some of us in the municipalities may not be as creative as we are supposed to be” (P3).

“We were challenged because we had a staff that needed help in understanding. We have councillors who need help in understanding. We need to be capacitated and have the partners that are, you know if the National Office is putting people that will understand and change my business in such a way that it will be responsive to this, that will be a plus ”(P4).

The participants indicated that councillors in rural communities' wards are aware of the term Fourth industrial revolution, but they don't understand what it is. They indicated that councillors might demand new cell phones, claiming we are in the ^{fourth} industrial revolution era. To most councillors, 4IR technologies are about receiving electronic documents via email. Both politicians and administrators in municipalities don't have the right skills, knowledge, and understanding of emerging technologies, even though they have a clear role as decision-makers.

“Today, you will hear councillors demanding the latest phone, and when you ask them why, they tell you that we are now in the 4IR, which shows that they do not understand this concept of 4IR. You will also hear them talking about receiving documents via emails because we are in 4IR, which concludes that people in senior positions need help understanding this concept. If we are talking about 4IR, we are talking about you engaging with an intelligence chatbot without the involvement of a human being. Citizens can engage with a chatbot about the processes they need to follow for water application, capturing all citizens' details required for the process. Moreover, to them(councillors), it only ends with emailing” (P1).

Figure 6-3 illustrates the building of theme “emerging technologies illiteracy” and frequently appearance of code in sub-themes. Furthermore, it shows the relationship between sub-themes.

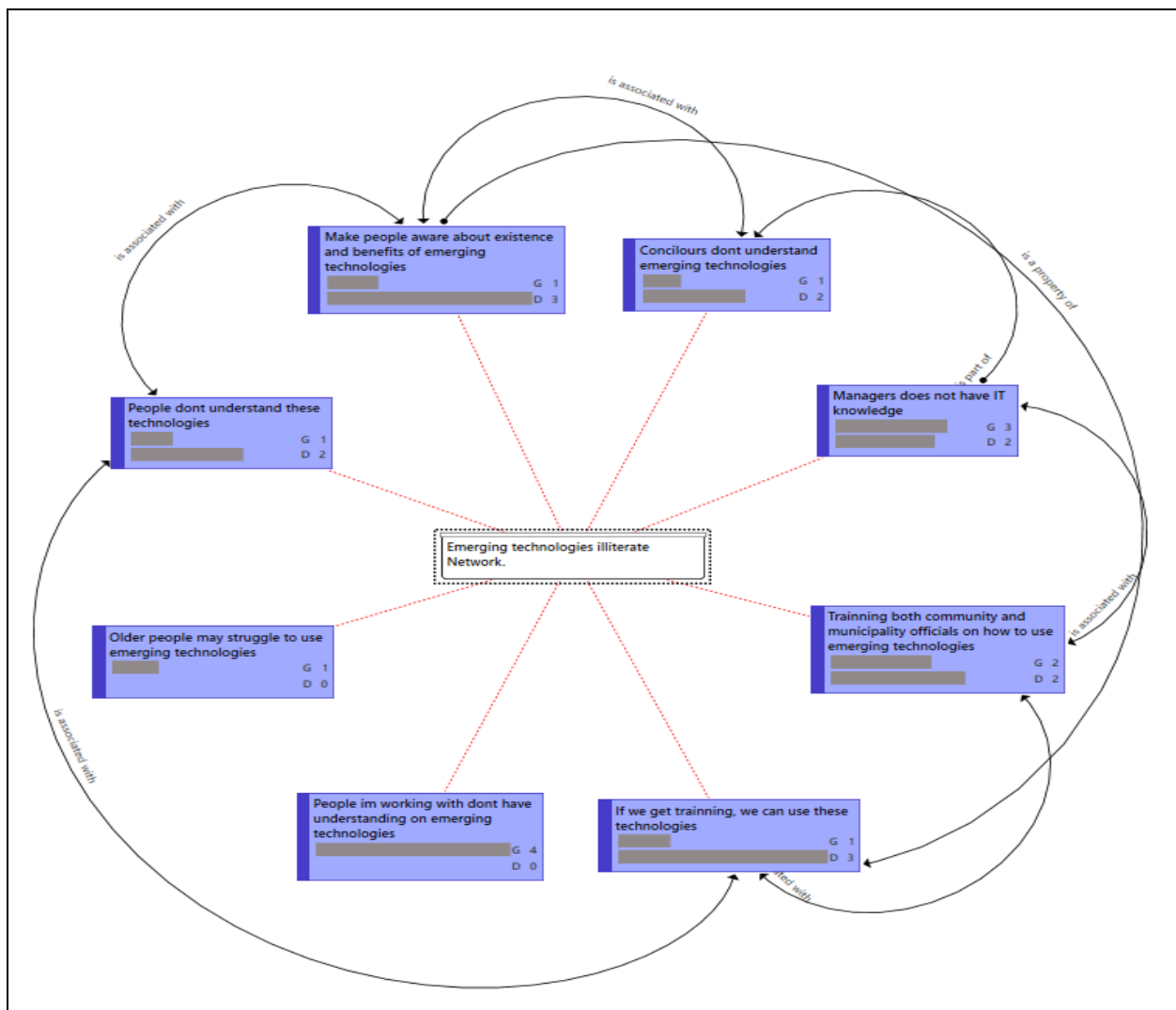


Figure 6- 3: *Emerging technologies illiterate Network.*

6.5.2 Deficiency of digital transformation expertise and technical capabilities

Digital transformation is a holistic process that requires expertise and technical capabilities. Hence, there is a need to have business analytical skills as part of your digital transformation in understanding the right processes that need to be transformed, as indicated by some participants. Municipalities in rural communities do not possess those necessary skills, which private organisations benefit from. A good example is how the banks keep changing their infrastructure, repositioning, and adding new features to it. IT technical capabilities must complement expertise in emerging technologies. Some study participants further indicated that government institutions have a dedicated department responding to new technological trends and information technology demands. However, it is very difficult to see if the already established departments are contributing positively towards integrating emerging technologies into municipalities' business models. It was also mentioned by another participant that municipalities in rural areas of South Africa do not have IT innovators and IT experts; hence, some participants indicated that they believe that once they have that kind of human resources

who are technologically innovative and have expertise in ICT, it will be easier for municipalities to engage in digitalizing their business model through the adoption of emerging technologies.

"That's why, in the institution, you want your business analyst to assess and predict that this business must be at this stage in the next five years. Like what banks do, if you look at the banks, you will realise that after two years, banks change their setup, such as ATM infrastructure; those are the results of people who are assessing. So, municipalities need something like that: people who will tell us that our current business processes might no longer be effective in the next five years" (P1).

"We need people like web designers in the government. We need people who can come up with different things, people who are IT experts. Once you have that kind of people, you can move quickly regarding IT as an organisation. Most government institutions have IT sections responsible for responding to IT demands or current digital communication demands. It is challenging to move if you have those" (P5).

The study participant also signalled the need for supporting expertise to drive digital transformation processes and the importance of complementary skills to support digital transformation initiatives in municipalities. For example, investing in technologies such as robots must be complemented by people with the right skills to assist the organisation in infrastructural maintenance. In addition, it was also indicated that municipalities cannot only invest in emerging technologies, but there is also a need for users who can convert data captured from different sources into information.

"So, you go to buy a Ford car; Ford must be able to service your car, and they must be able to maintain your vehicle. So, who will maintain that if we say we are implementing robots, for example, or doing artificial intelligence or the Internet of Things, who will interpret whatever the Internet of Things has captured ". (P1)

6.5.3 Lack of resources.

Furthermore, a lack of resources emerged as another major challenge behind rural municipalities' delay in the adoption of emerging technologies. Figure 6-4 illustrates the relationship between sub-themes and theme "lack of resources".

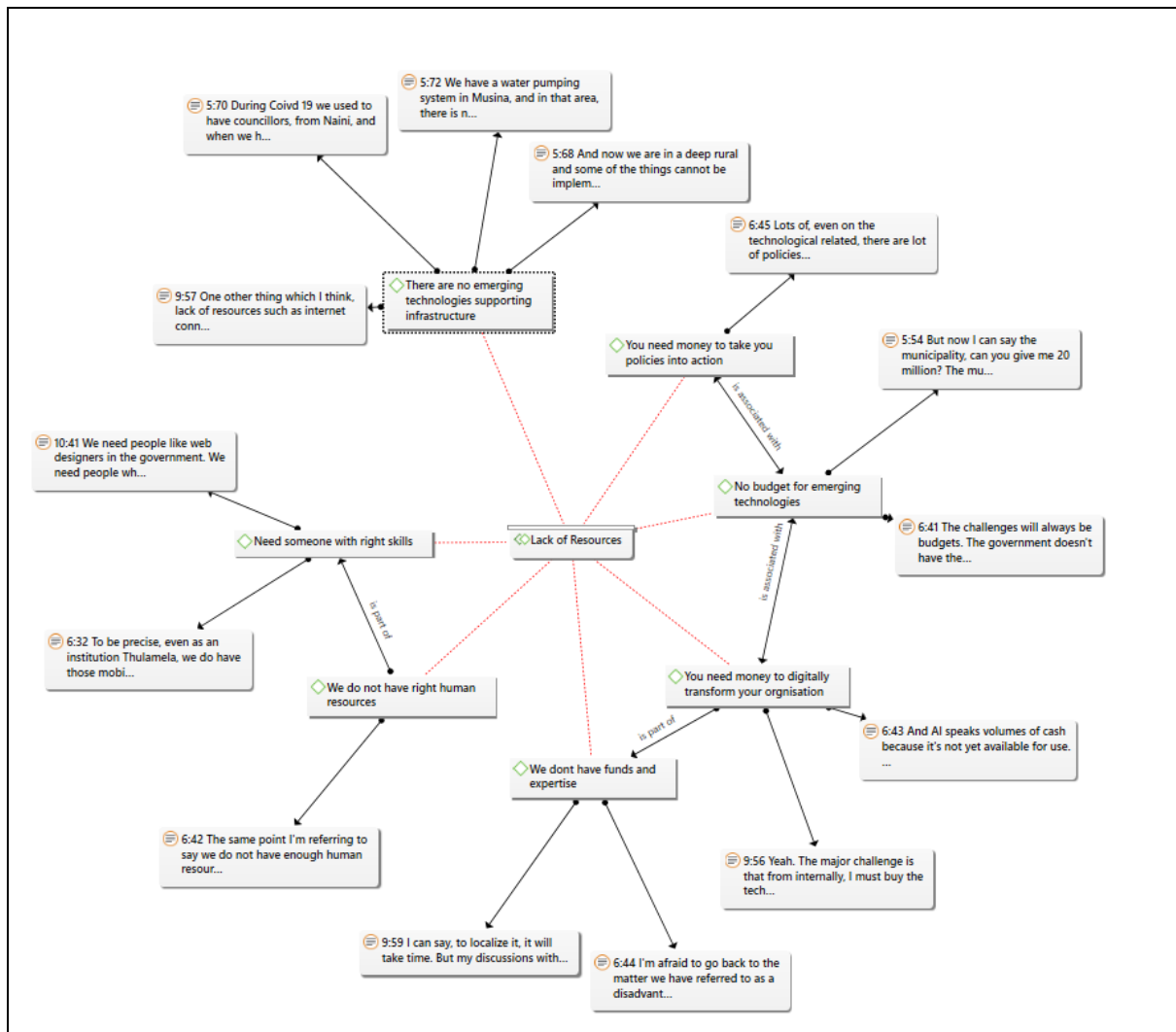


Figure 6- 4: Network illustration of lack of resources.

6.5.4 Lack of financial support.

Municipalities in rural communities are not immune to business model transformation, moving towards a more technological-based basic service delivery model. However, most participants pointed out financial insufficiency as a challenge in shifting to a more technologically based service delivery model.

Managers in rural municipalities' key departments believe that, as a country, we are not ready for a technologically based value proposition due to financial constraints. Some of the study participants see the need to plant intelligence systems in municipality reservoirs to monitor and control water pumping without the involvement of human beings. In addition, with the help of emerging technologies, municipalities can reply to queries from dozens of citizens at once, a step further from the telephonic and short message services currently adopted by many municipalities in rural South Africa. However, transforming the channels and methods currently adopted by municipalities in rural communities is very costly, as indicated by study participants. In some cases, mostly in public organisations, the digital transformation process

must be done from scratch, pushing the municipality to purchase the supporting technologies. Even though some participants recognise the benefits of emerging technologies, managers in rural municipalities do not have enough budget to support reconfiguring municipalities' business modes through adopting emerging technologies.

“But now I can say, the municipality, can you give me 20 million? The municipality has yet to get 20 million for now. The 20 million is a budget for the whole corporate services department. However, I will need 20 million to use artificial intelligence on certain reservoirs. When we are pumping water into the reservoir, there must be some intelligence to check the water level; once it reaches a certain point, it must be able to switch it off. So then, when you say that or present that process, they will tell you there is no need; we will have a human to control or watch the reservoir. So, that is what I'm saying. The budget plus the country still needs to be ready.” (P1)

“And AI speaks volumes of cash because it is not yet available for use. It is something you need to start from scratch. Furthermore, at least if you get a few people with money, we could be able to reply 10s to thousands of questions coming from our citizens. Unfortunately, that would be a costly exercise. So, cash is still a problem here”. (P4)

“Yeah. The major challenge is that internally, I must buy the technologies. Then the financial part becomes a problem”. (P5).

Availability of funds plays a significant role in driving business model shift; consequently, lack of financial resources can result in hesitation or rejection of technological transformation and innovative ideas. Funding is a critical component in digital transformation as I also determine the availability of other essential components of digital transformation, such as digital transformation infrastructure, which most participants have mentioned as one of their challenges in transforming the municipality business model.

6.5.5 Lack of emerging technologies supporting infrastructure.

To transform your business model as a municipality, you need the proper infrastructure to support that. Self-serving kiosks can reduce travel costs for citizens. The extra R60.00 traveling cost may be discouraging figures for those who need to travel first to pay the service bill, and there are chances that the person may decide not to pay. However, introducing self-serving Kiosks in rural areas may simplify life for our people in communities. To implement online banking applications for municipalities to assist those who stay far away, you must have the technology, internet connectivity, and cell phone boosters. Technological-based business models require proper infrastructure. There is a need for the country to respond to continuous technological evolution by conducting studies on this phenomenon. We cannot plant artificial

intelligence tools in the water pumping station near Zimbabwe because there is no connectivity, as indicated by study participants.

“For artificial intelligence, we need a proper infrastructure. These emerging technologies require us to have a proper infrastructure. You look now, and other countries have already passed the 3IR. They are fully utilizing the 4IR, but we are not yet fully utilizing the 3IR technologies because of a lack of infrastructure. We have a water pumping system in Musina, and in that area, there is no network connectivity; you can only communicate using Zimbabwean ISP (Simard and Airtime). There is no infrastructure, but the funny thing is that there is electricity. This shows that we have successfully implemented 2IR nationwide because a proper study was conducted. However, now we need to figure out what we are doing”. (P1)

“Another thing I think is lack of resources or infrastructure such as internet connectivity. Suppose we have a regulation on our service providers that asks them to install Fiber in our communities. In that case, I think it will improve our business, how we access our communities, and how our communities are accessing us”. (P4)

Finances and infrastructure must be complemented with the right skills or expertise; hence, municipalities need skills as complementary assets to technologically based business models. Organisations need to develop technical capabilities to succeed in the digital transformation process. Some participants indicated that it is easier to transform your business model in response to technological demands with people with the right skills. Hence, municipalities need technical skills, such as web designers in government.

“We need people like web designers in the government. We need people who can come up with different things, people who are IT experts. Once you have that kind of people, you can move quickly regarding IT. Most government institutions have IT sections responsible for responding to IT demands or current digital communication demands. If you don't have those, it isn't easy to move. Today, we can connect to people who are even outside our country. In our last mayoral committee meeting, a presenter joined us via Teams and shared the presentation on screens” (P5).

Unclear implementation strategies- the thematic analysis detected that the unavailability of implementation plans, procedures, and frameworks to adopt emerging technologies is one challenge behind the delay in the adoption of emerging technologies-driven business models.

6.5.6 Poor Information Technologies Policies.

Emerging technologies are known to benefit organisations and their customers or clients. However, these technologies are not plugging and playing as there must be standard guidelines to follow as agreed upon by the organisation. Participants indicated that one major

challenge for municipalities in adopting emerging technologies is the lack of a proper framework. Even though municipalities would like to incorporate emerging technologies as part of their security and monitor their service hotspots, policies still need to address emerging technologies directly. The study participants alluded to the delay in implementing technological policies, and this is due to a lack of resources. This is supported by some participants who linked the policy delay to a lack of funding for the digital transformation initiative. One study participant indicated that they may have an excellent information technology policy document aimed to be implemented in three years. However, because of lack of funds, it will always take a while to implement. Thus, a good policy document must be accompanied by money; otherwise, it is just a document waiting for the dust.

“So, currently, we do not have policies that promote monitoring municipality property vandalism hotspots using emerging technologies like what is currently going on in Albasin Dam. That is where emerging technologies such as cameras or robots come in, and by doing so, we will be able to curb the vandalism of municipality properties” (P1).

“Yeah, because the framework will be directly properly, but if again. According to the framework, something should be completed in three years; it takes 15 years. To accomplish what takes a framework of one year, it takes us about four or five years, which means your implementation of what is on that policy document will take place in 15 years because of the little money that you have. By then, technology is not waiting. Which means you will never catch up with technology. You may find that we are still receiving policy documents that are far away from the current trends of technologies, maybe seven times better than the trend. So, we are always behind. Unfortunately, technology is one thing that, to keep up with, you need to have the money for it; otherwise, you might as well forget about technology”. (P2)

“My challenge is that we need support from the national or even other upper bodies to give or assist us regarding the information, like the policies that should govern that. So that when I go into the actual implementation, it must guide the relationship it should have with the private sector” (P4).

The national imperatives should guide me in terms of guiding my relationship with the service providers as to what it is that I am expecting from them and what it is that they are expecting from us. Then, as the bylaws will even govern our relationship with service providers so that when they go down into the communities, maybe they are going to implement the Fiber, we are guided by the regulations that are coming from the top to say, if you are going to implement this, this is how you should implement it. Once we have regulations that govern the whole process, then that will help us because I will be able to tell them in terms of regulation number that is coming from national office (P4)

Digital transformation processes require clear documentation and implementation plans, guiding managers in implementing the best plans. Guidelines and bylaws will clear expectations and further assist managers in managing their relationships with municipalities, external organisations, and community involvement in digital transformation processes.

6.5.7 Deficiency of external associates and research

Furthermore, the thematic analysis detected deficiencies in external associates/ collaboration and research as some of the challenges affecting rural municipalities shift from traditional-based business models into emerging technologies-driven business models.

Institutions of higher education, training, and private organisations are vital in the country's digital transformation processes. They are sources of knowledge and skills required to digitalize business models through research and other technical innovations. However, in the South African context, existing relationships between education entities and municipalities, private companies, and municipalities seem not to benefit municipalities in adopting and using emerging technologies as part of service delivery. Some participants acknowledge research in municipalities and digital transformation; furthermore, it was also mentioned that Universities are not doing enough to engage rural municipalities in emerging technologies.

"The University of Venda, you can say, as a way of reinvesting back to the community, let's test this technology. To say we have a technology course in the university, let's do it practically to say let's go and build a reservoir using the three 3D" (P1).

"If you can check, there's nothing at all in there; I think it's only UJ that implemented. I think a four-room using the three 3D in the whole country, so I will say the country, South Africa, we're not, we're not yet ready. We are not yet ready because the education system is one of the challenges. When the second industrial revolution, when they started to have electricity and all those things, they started to convert from primary or from secondary level to say you need to do science and maths then from there" (P1).

6.6 Participants Comparative analysis for qualitative strand.

The group of interviewed participants was comprised of managers from different departments, such as Information Technology (IT), Local Economic Development (LED), and Communication. The researcher recognizes that perspectives towards emerging technologies might differ due to factors such as level of management, departments and area of specialisation and age. However, the understanding of emerging technologies might differ due to their areas of specialisation. A manager in a local economic department might perceive emerging technologies as support but not a strategic partner, a standing position for an IT

manager. Furthermore, a mayor in a local municipality might have different perceptions towards emerging technologies due to the nature of his or her position, which is more politically focused than a manager recruited on qualification. further includes a mayor in one of the municipalities. Older participants, who are considered digital migrants might have different perception to digital natives who are young.

6.7 Chapter Summary

The chapter outlined how managers in rural municipalities perceive the integration of emerging technologies into rural municipalities service delivery business model. Thematic analysis reveals that managers in rural municipalities have positive perception towards the initiative. Managers believe that adopting emerging technologies will enhance government-citizens interaction, and it will also enhance rural municipalities' performances. Furthermore, the analysis reveals that lack of resources, knowledge, skills, expertise, transformation capabilities, unclear digital transformation polices and strategies, research, and external associations. The following chapter (7) gives an overview of study discussions.

7 CHAPTER 7: DISCUSSION, CONCLUSION AND RECOMMENDATION.

7.1 Introduction.

This chapter outlines the main conclusions emerging from the study, followed by the study's implications on theory and practice. Finally, the chapter ends with an outline of the limitations of the study, as well as proposed areas for future research.

The following are the findings and discussions on how citizens perceive the integration of emerging technologies in rural municipalities' service delivery model.

7.2 Discussion of the findings.

Demographic factors towards behaviour intention to use emerging technologies in rural municipalities.

The quantitative study results in Chapter 5 show that the demographic variable age has an insignificant impact on citizens' competencies to use emerging technologies such as mobile payment systems. The study shows that most of the study participants are good users of online platforms, such as social media platforms and mobile payments. This shows the reduction in the digital divide gap between young and old in rural areas of South Africa.

Previous studies such as Broos and Roe (2006) discovered that a huge interest in the adoption of technological innovations, use, and understanding of emerging is coming from younger people, while older people are found to be excluding themselves from digital transformation and information society. However, this study could not conform to the findings by Broos and Roe (2006) as the results show a significant improvement in the use of online-based platforms. The study results mean that both older and young people are potential beneficiaries of ICTs and emerging technologies, as indicated by Alvarez-Dardet, Lara, and Perez-Padilla (2020).

Furthermore, the study shows that participants are interested in adopting an online business model in rural municipalities where they can interact more with municipalities online than physical visits. This includes payment of service bills online and attending meetings online using applications such as MS Teams. Furthermore, the study indicates that it was largely dominated by females, making up more than half of the study sample size. The study by Broos and Roe (2006) identified age and education as the main determinants of the digital divide (knowledge and understanding of technological innovations), while the gender gap as a major determinant is significantly improving. Thus, gender plays a less significant role in adopting and using emerging technologies, which is supported by this study.

In terms of level of education, the study shows that it was dominated by people who can read

and write, those who have completed their grade 12, and those with university qualifications. Language barriers, literacy, and lack of understanding of technical terms affiliated with emerging technologies such as the Mobile platforms, Cloud Computing, and Artificial Chatbots and other emerging technologies platforms are more likely to play a major role in adopting and using emerging technologies.

The study results show less significant level of education contribution in competencies and perception towards emerging technologies, which is different from the findings by Kusumaningtyas and Suwanto (2015) who discovered differences in use of ICT based on the level of education. This means that even those who are more educated with postgraduate qualifications may also have a negative perception towards the integration of emerging technologies into municipalities' basic services service-delivery model.

In this study, demographic factors, which include age and level of study, were discovered to be less contributors in mediating or determining citizens behaviour intentions to accept the integration of emerging technologies in rural municipalities service delivery model; however, this is different from the findings by Alvarez-Dardet, Lara, and Perez-Padilla (2020) who discovered the as a determining factor of adoption of technologies.

Digital literacy is a key significant determinant of the adoption and use of emerging technologies; thus, people who are digitally literate are more likely to accept and use technologies. There is a great abundance of sources of information to obtain skills and knowledge about the use of emerging technologies. Hence, the study reveals that most of the participants have the knowledge and skills to navigate emerging technology platforms. In addition, the study results reveal that most participants highly rate the idea of shifting from the traditional business model into a technologically based business model.

The private sector in South Africa and other government-owned entities are responding positively to emerging technologies by incorporating them into their business models. For, example, KFC introduced a self-serving kiosk, Eskom has its own chatbot (Alfred) to instantly report electricity supply services issues, and MultiChoice chatbot and Vodacom chatbot (Tobi); all these innovations are triggering citizens' increased ICT demand and interest, and this has changed how private organisations operate, in handling user queries and customers services, moving into less human based to automation as indicated by Ko et al (2021) that some tasks can be done anytime and anywhere without human intervention.

The study shows that internet accessibility is no longer an issue in rural communities of South Africa, as most of the participants indicated that they are regular internet users, this means

that most of the people in rural communities are receiving network coverage, signalling the positive step towards reducing digital divide gap. The increase in internet accessibility was also recorded by Chipeva Cruz-Jesus, Oliveira, and Irani (2018) who indicated a global increase in internet access and use, development in applications and infrastructure technologies, which are drivers of social and cultural expression and playing an important role in citizens and government interactions. Thus, having the right infrastructure to support the use and adoption of emerging technologies may change the perception towards emerging technologies initiatives. The study results represent the effort put forward by the South African government to reduce the digital divide by providing continuous internet connectivity in rural communities, and doing so will pave a way into enhancing government accessibility and reachability.

Objective 1: Citizens and municipalities departmental managers perception towards incorporation of emerging technologies in local municipalities

Citizens' perspective:

Relatively advantageous- The study results found that citizens in rural communities believe that emerging technologies-driven service delivery business models in municipalities will offer them more benefits than the traditional business model of delivering services. This is because the traditional-based business models are comprised of manual business processes that require human intervention to be successfully completed; as a result, in many cases, these models are characterised by inaccuracy, delays, and backlogs. The study findings show that citizens in rural communities and villages perceived emerging technologies as more beneficial due to their ability to offer quick, easy, and less costly services as they can be able to interact with municipalities without having to travel. The adoption of mobile payment systems allows the payer to transact into the payee's account without any human intervention; such capabilities allow the payer to reduce all costs involved, such as traveling costs, and saving time. Therefore, integrating mobile payment systems into municipalities' business models will alleviate poverty and promote convenience by reducing the cost of interacting with municipalities as they will no longer have to travel to municipalities' offices to pay the service bill.

Furthermore, the study found that citizens in rural communities and villages also believe that adopting an intelligence chatbot will save them time as they can report service outages any time of the day without having to worry about time and geographical barriers. Artificial chatbots can receive queries, respond, and record queries from multiple sources quickly and easily without human involvement. These capabilities have the potential to benefit both users

(citizens and municipalities) as citizens can send queries and report service outages on time, hence perceived advantageous by communities in rural areas. The use of wireless sensors with the capabilities to monitor both physical and environmental issues such as temperature, sound, vibration, pressure, motion, or pollutants, as indicated by Newman et al. (2012) in monitoring public service delivery systems will offer more benefits to both citizens and municipalities due to instant alerting which triggers quick responses. These findings also conform to study results in India who share similar characteristics to South Africa as a developing country by Sakolkar, 2023, who find that participants believe that digital solutions will enhance response time and easier accessibility of information between government and citizens.

The study discovered a positive relationship between the independent variable, relative advantage, and the dependent variable, citizens' behaviour, and intention to adopt and use emerging technologies. The conducted structured equation model shows a CR value =2,178, which is significant at 0.029. This shows that citizens in rural municipalities are more likely to adopt emerging technologies-driven business models introduced by municipalities due to their potential benefits. However, previous studies examined and discovered that safety concerns attached to internet-based models due to the potential threats. According to Rooy & Bus (2010) it is an arms race between those developing measures to protect digital technology users and those trying to break through them. This race is continuously creating an element of insecurity for online users, which also affects their trust and privacy perceptions; thus, other studies have found safety perception as a major factor affecting customers'/citizens' intention and willingness to adopt emerging technologies. This study also examines the role of perceived safety in the adoption of emerging technologies in municipalities' service delivery models.

Safety Perception:

Online safeness (privacy, trustworthiness, and security) has been examined in different studies as factors affecting citizens' behaviour and intention to adopt technologies. According to AlHogail (2018), security factors were found to be the most critical factors that affect the decisions to trust and adopt IoT products. Thus, there is a relationship between security and trust in the adoption of emerging technologies. In this study, perceived security, trust, and privacy were combined because of a relationship between them to form construct safety perception, which defines the level at which technological users believe that using emerging technologies as part of municipality interaction is safe from any form of attack. The study discovered a negative relationship between perceived safety and behaviour intention to adopt

an emerging technology-driven business model in rural municipalities. Conducted structured equation model reveals a CR= -2,065, which is significant at 0.039, showing that perceived safety is a major concern in digitalising service delivery model in rural municipalities.

The study's findings conform to the findings by Mohammed et al. (2017) who discovered a strong relationship between internet safety perception and users' willingness to use online platforms. Furthermore, Rosario and Dias (2023) indicated that the ability of online applications to collect personal information without user consent is a cause of concern to users who intend to adopt emerging technologies. The study results means that, even though people believe that emerging technologies business models have multiple advantages and more beneficial than manual based service delivery model, there are high risks of rejecting rural municipalities technological innovations due to safety uncertainties associated with emerging technologies such as robots, IoT, artificial intelligence chatbots, kiosks, cloud computing, predictive analytics, and mobile payment systems.

Facilitating conditions, perceived complexity, and perceived compatibility have been studied in previous studies such as Tsai (2012) and Nikou and Economides (2017) as factors determining the acceptance of emerging technologies. Furthermore, facilitating condition has been discovered to be the determining factor affecting user behaviour and intention to use, which is defined as the degree of a citizen's willingness to use emerging technology. However, the current study did not establish the relationship between the dependent variable, citizens' behaviour, and intention to use emerging technologies, and the independent variables perceived complexity, facilitating condition, and perceived compatibility.

The study discovered that citizens perceived emerging technologies as advantageous and offering more benefits compared to the traditional business model currently adopted in rural municipalities. However, their intention to use is largely affected by emerging technologies' safety (security, trust, and privacy).

On the rural municipalities' perspectives, departmental managers believe that integrating emerging technologies into their business model will be beneficial to both citizens and municipalities by enhancing government-citizens interactions. The study shows that managers in rural municipalities believe that emerging technologies in rural municipalities will enhance interactions between government and citizens. Emerging technologies have the capability to promote citizens' participation in municipalities, such as planning and IDP projects. Ms. Teams, Zoom, and other technologies can enable people to meet virtually, thus reducing travel costs and saving time.

Furthermore, using emerging technologies, municipalities can easily distribute government information about functions and other activities, such as sending alerts and other notifications about municipalities, without having to spend more. WhatsApp and Facebook, for example, have the features to allow individuals to meet virtually and distribute information to the masses at once. These technologies have reach advantages as their messages can be received everywhere in the world, provided you have internet connectivity and the right infrastructure, which are vital in digital transformation. The use of artificial chatbots in rural municipalities will further enhance municipalities' accessibility and facilitate instant responses. Thus, citizens can report or inform municipalities about basic service outages and other related issues.

Municipalities departmental managers perspective.

The study results reveal that managers believe that adopting emerging technologies in rural municipalities service delivery model will be useful as it will enhance rural municipalities' performance. South African municipalities are characterised by poor performance due to poor service delivery. However, the study shows that departmental managers believe integrating emerging technologies in rural municipalities' business models will improve the quality-of-service delivery. Drones have the capability to monitor and capture information about the villages or people with little or no human effort involved. Adopting drones to monitor water, garbage collection, sewage systems, potholes, and other affected service delivery infrastructure will enhance municipalities' quality in responses by providing them with evidence about the state of the situation. Furthermore, drones can provide municipalities with information about how villages are structured, thus enhancing rural municipalities' plans for the delivery of services.

Using artificial bricklaying technologies will enhance municipalities' performance by improving production. Artificial bricklaying technologies have the capability to reduce backlogs due to their ability to complete tasks early. This will also save municipalities more money as the project schedule will be reduced. With artificial bricklaying technologies, a project that takes 12 months to be completed can be reduced by more than half of the initial planning, thus saving cost and time, and further improving municipalities' performance by delivering products early.

Planting artificial sensors and other IoT services will allow municipalities to monitor communities' water supply services and sewage systems. These technologies have the capability to detect faults instantly and give feedback to municipalities, thus enhancing performances as municipalities will be able to respond early. The study by Hofisi & Chigova, 2023, also outlined the potential benefits of digital transforming local municipalities, such as

they can improve operational efficiency, reduce costs, and provide better services to the citizens.

Table 7. 1: *Correspondence Table between quantitative and qualitative results strands.*

Quantitative strand	Qualitative strand
<p>Relative advantage Citizens believe that the emerging technology-based business model will offer them more benefits than the off-the-counter service delivery model currently adopted in rural local municipalities; this corresponds to the perceived usefulness obtained from the qualitative strand.</p> <p>Perceived Safety Even though emerging technologies are associated with potential benefits, safety issues such as security and privacy have a significant impact on the citizens behaviour intention to adopt.</p>	<p>Perceived usefulness Managers in rural municipalities believe that emerging technologies will enable municipalities to communicate easily with communities, enhance delivery of services and quality of service.</p> <p>Perceived Compatibility The managers in rural believes that emerging technologies potentials are aligns to the duties of local municipalities, mainly improving service delivery</p> <p>Perceived Complexity. Qualitative strand indicated that lack of knowledge, skills and understanding towards emerging technologies, hinders local municipalities initiatives to adopt emerging technologies driven business model. This differs to the quantitative strand which failed to establish significant relationship between knowledge, skills and behaviour intention to adopt.</p> <p>Facilitating Condition Qualitative strand reveals that rural local municipalities lacks, education, knowledge, policy towards digital transformation. This contradicts citizens position on the knowledge and skills towards navigating and use online platforms.</p>

The study results complement and further explain the perception towards emerging technologies originating from the quantitative strand. Both sets of participants believe that integrating emerging technologies into rural municipalities' service delivery model will enhance

service, reduce cost and enhance the quality-of-service delivery. Thus, both citizens believe that using emerging technologies as a method of integration will benefit them. However, the qualitative strand further reveals that rural municipalities do not have necessary requirements to implement digital transformation initiatives. Furthermore, the study explores the challenges behind municipalities' delay in adopting emerging technologies.

Objective 2: Rural municipalities' challenges towards adoption of emerging technologies.

The study discovered that digital illiteracy is one major challenge affecting digital transformation in rural municipalities. Municipalities in rural communities are characterised by a lack of emerging technologies awareness, knowledge, digital transformation understanding, and training. For an organisation to adopt emerging technologies, it requires necessary support from its decision-makers through digital strategic planning and objectives. However, in a situation where decision-makers lack knowledge, awareness, and understanding, digital transformation initiatives can be negatively affected. Organisation managers need to have a positive perception towards the potential benefits of digital transformation activities to support the initiative. Councillors in municipalities do not have enough understanding of emerging technologies, and many still cannot differentiate between 3rd and fourth-industrial revolution technologies.

Politicians are major stakeholders in municipal councils; hence, their input can determine the start or delay of any project as they represent and act as a link between citizens and government. Hence, councillors' positive perception towards emerging technologies may enhance the digital transformation drive in communities and rural municipalities. With limited knowledge, less training, and a lack of understanding, councillors are less likely to push digital transformation initiatives. Municipalities are usually more likely to invest in improving old information systems than reconfiguring their business processes.

The deficiency of emerging technologies expertise and lack of resources is another challenge behind rural municipalities delay in the adoption of emerging technologies. This is in line with the statement by Rosario and Dias (2023) who in their study indicated that adopting emerging technologies will always be a daunting and complex activity if there are deficiencies in IT expertise and resources. The study shows that municipalities in rural areas do not have the right expertise and skills to support digital transformation initiatives, hence the delay in adopting and utilising emerging technologies. Digital transformation requires innovators, business analysts, and, more importantly, leaders with positive perceptions towards the use of emerging technologies to assist in the business process reconfiguration process. ICT

departments in municipalities are largely comprised of people with basic IT skills; there are no experts such as web design, developers, business analysts, etc, which form a key component of digital transformation.

Furthermore, municipalities are not financially equipped to engage in digital transformation initiatives. Thus, a lack of resources has also emerged as a major challenge facing rural municipalities in the adoption of emerging technologies. In an organisation where leaders do not recognise the need to reconfigure their business processes by adopting emerging technologies due to their lack of understanding, they are less likely to invest more funds into such initiatives. Municipalities rely on national government grants and other internal activities as their source of funding to sustain themselves; however, they can also source funds from external funders. However, the study further shows a deficiency in external support or relationships; hence, there is less funding coming into municipalities to drive digital initiatives. Emerging technologies infrastructure plays a vital role in reconfiguring organisation's business models. However, the study discovered that there are no supporting infrastructures to support the reconfiguration of rural municipalities' business models. Installing self-serving kiosks in villages requires network connectivity, planting wireless sensors in water pumping systems, and planting artificial intelligence sensors in local sewage systems; all require internet connectivity and other supporting technological infrastructures. Thus, a relationship exists between financial resources, infrastructure, and interest. Municipality financial managers who do not clearly understand the benefits of adopting technologies will also have issues in realising funds for digital transformation. As a result, municipalities are more likely to struggle to have the right infrastructure to support the implementation of emerging technologies into their business model. IT capabilities, Human resources, Sufficient IT infrastructure, and IT knowledge were all found to be vital in the adoption of technologies and realising benefits from them, as indicated by Basheer, Siam, Awn, and Hassan (2019). However, this study discovered municipalities in rural communities still face a major challenge in adopting emerging technologies due to deficiencies in critical enablers of emerging technologies such as resources, skills and expertise, knowledge in ICT and infrastructure.

The study discovered that rural municipalities lack clear implementation plans, updated frameworks and policy documents, or guidelines for digital transformation. Policies and guidelines are vital for digital transformation projects in any organisation. People involved in the projects need clear guidelines on approaching digital transformation initiatives. A clear guideline will help answer the question of how much they need to invest in the project, how to engage citizens and other stakeholders, who should take responsibility, and so on. However, as it stands, those questions fail to get clear answers due to the nonexistence of clear

implementation documents and policies.

Research and collaborations are significant in organisations for information knowledge sharing, skills, and expertise; hence, organisations need to invest more in research to have a clear understanding of their ecosystem. Research is a source of new knowledge and has the potential to provide solutions to the organisation's existing problems. It is through research that organisations develop the capabilities to sense, seize, and transform their business model. However, the study suggests that municipalities in rural municipalities are investing less in research. Technologies are continuously evolving, and that requires an organisation that is active in research to be able to respond to technological changes. Furthermore, the study discovered that municipalities are not collaborating more with private organisations, universities, and colleges to benefit from their expertise. Collaborating with external entities has been used by other organisations to develop knowledge and skills to enhance their operations. The findings are in line with the findings by Aruleba & Jere, 2022 on the systematic literature review to explore digital transforming challenges in rural areas of South Africa. The findings also aligned to Hofisi & Chigova, 2023; Shava & Doorgapersad, 2022, who both find that digital transformation can enhance service delivery and help solve local municipalities problems; but their study clearly articulates challenges faced by local municipalities as also confirmed by this study.

Objective 3: classification of digital capabilities local government needs to develop in response to the dynamic scope of operation, enhancing service delivery system and promote virtual interactions.

Based on the study findings, it is significant for rural municipalities to build and modify their capabilities. Capabilities are the pillars into digital transformation as mentioned by Correani et al., 2020; and Rueckel et al., 2020. Rural municipalities need to capabilities to respond to technological changes which are bring changes on how services are delivered to organisations customers and other stakeholders. Digital transformation is a complex task which requires expertise from strategic formulation to strategic implementation, hence this study categorise the capabilities essential for rural municipalities digital transformation initiatives.

Categories 1. Dynamic capabilities (sense, seize and transform)– for the rural municipalities to respond to emerging technologies, they need to develop abilities to analyse and understand their ecosystem. This will enable them to understand changes in citizens behaviour, pollical changes, and disruptive innovation. Thus, sensing capabilities, an element of organisation dynamic capabilities. Furthermore, rural municipalities need to develop capacity to formulate

digital transformation strategies and align them to organisation to enhance customers value creation. In addition, rural municipalities need to develop capacity to implement digital transformation strategies by identifying the right approaches, sourcing funds, and establishing partnerships both internally and externally.

Categories 2. Digital Transformation High Order Capabilities- this category focuses on the rural municipalities abilities to redefine their way of operating through adoption of emerging technologies. These capabilities should be able to convert ideas, policies and strategies into action, through leadership, research and development, collaboration and staff and stakeholders' development. The study results shows that rural municipalities are lagging in-terms of integrating emerging technologies to transform and enhance their operation, mainly service delivery. Therefore, based on the study results, the researcher advocates that rural municipalities need to build a pool of capabilities discussed in study chapter 2 to solve the challenges.

In digital transformation initiatives, organisation leaders support, perception and enthusiasm are very critical in both stages of digital transformation (strategic formulation and implementation), hence, it is significant for organisation to invest into their leadership capabilities to build leaders who will support digital transformation initiatives. Digital transformation requires leaders who perceive the impact of emerging technologies as positive. Thus, leaders who perceive digital transformation as a solution to organisation problems and as a gateway to enhancing customers value creation are more likely to financially support the initiatives and allocate budget for such projects.

Research and development capabilities- knowledge and information is a vital component in digital transformation initiatives. Investing into research and development projects through partnerships with universities and other institutions and incentivising employees to enrol into research projects will enhance rural municipalities digital transformation programs. This will increase knowledge capacity and understanding towards emerging technologies such as IoT, chatbots and artificial intelligences.

Collaborative capability- through partnerships with other institutions both private and public entities is very vital to any organisation digital transformation. Developing collaborative capabilities will enable municipalities to close the capabilities and skills gap available in rural local municipalities. Private sectors are far ahead of rural municipalities in transforming their business model using emerging technologies, thus, partnering private organisations may improve digital transformation strategy component (formulation and implementation of

strategies)

Staff and stakeholder development capabilities (knowledge, technical skills, and expertise)- as a citizen's centric institutions, rural municipalities will benefit from citizens participation into ideation processes towards digital transformation. Adopting citizens journey approach will enable rural municipalities to understand the needs of customers and customise their service delivery based on the citizen's needs. Including citizens into rural municipalities will enhance their skills, knowledge, awareness and understanding towards emerging technologies. Furthermore, engaging employees into digital transformation strategies formulation will also enhance participation, skills and knowledge and further remove barriers such as fear of the impact of emerging technologies to their jobs and resistance to change.

Objective 4: To develop a digital transformation framework for the South African rural local government to successfully integrate emerging technologies into their business model.

In response to emerging technologies evolution in municipalities, the researcher proposed a framework which will enable rural municipality to scan and understand their environment for technological opportunities, identifying and understanding the key enablers of digital transformation, and key technologies to adopt. Thus, the framework adopts the concept of TOE by looking at three dimensions (environment, organisational and technological). Previous study by Ferguson (2019) identified seven strong dimensions as core of mastering digital transformation processes strategy, people, organisation, customer, ecosystem, technology, and innovation.

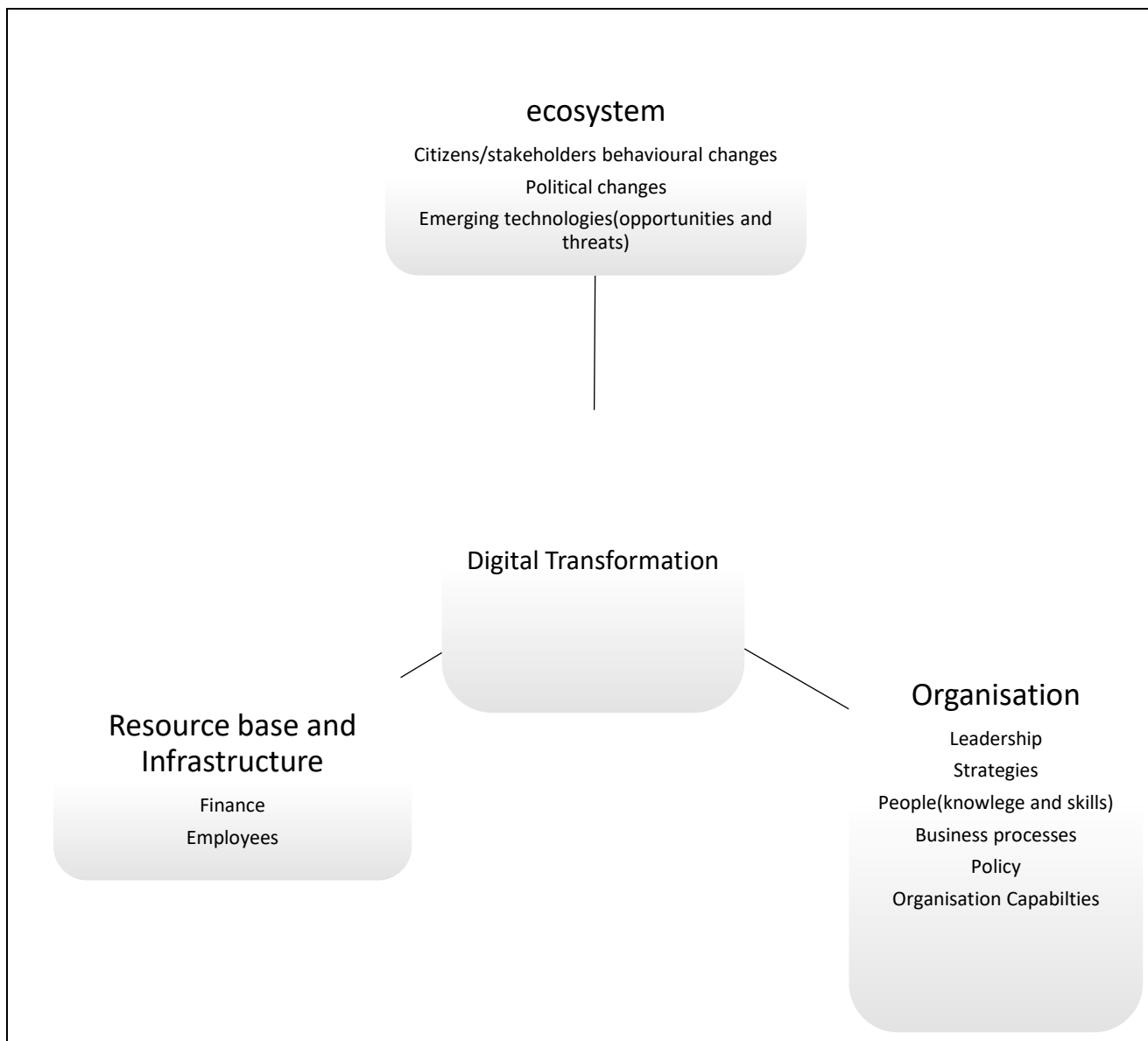


Figure 7- 1: Rural municipalities digital transformation framework.

7.3 Rural municipalities digital transformation framework application.

Shifting rural municipalities service delivery model through digital transformation requires a framework which integrates the organisation ecosystems, organisation, and organisation infrastructural base. A developed framework comprised of three major integrated dimensions (ecosystems, organisation, and infrastructure base) and sub-dimension.

An ecosystem demission: enables the organisation to scan their environment which they are operating, that will enable organisation to discover and understand changes in customers and stakeholders' behaviour (perception, demands, and needs). The primary aim of organisations is to create customer value, hence understanding customer and stakeholders'

needs is a significant factor towards organisation customer value creation. Therefore, customers value creation should be in the centre of digital transformation. Furthermore, municipalities are not characterised by competitive environment, thus their aim is to offer better services efficiently and effectively. However, municipalities are political entities which are constantly affected by political changes which may disrupt service delivery ideas. Thus, changes in politics may lead into organisation structural changes and policy development. Furthermore, for the success of digital transformation, organisations need to scan disruptive technologies to identify challenges and opportunities presented by emerging technologies.

Organisation dimension: organisations are comprised by leaders, strategies, business model, people, and capabilities (operational and high order) which enables organisation to create customer value and enhance services delivery. Organisations should be agile, to be able to respond to uncertainty presented by organisation ecosystems. It is significant that for organisations to establish a team or to works towards building digital transformation strategy formulation and implementation to respond to ecosystems dynamisms. However, this requires an organisation leader who recognise the positive impact of digital transformation in organisation business model. People are an important factor in organisation transformation, their perception, and behaviour towards digital transformation are very vital to the success of implementing digital transformation strategies; communication, knowledge, and trainings towards incorporation of technologies into municipalities business model is very necessary. Furthermore, for the success of digital transformation, organisations need to understand key tasks, services, and activities in organisations business model. This enables organisations to identify, the tasks, services and activities that needs to be digitally transformed to enhance service delivery. However, the process of digitally transforming organisation business model requires right capabilities. Organisations digital transformation initiative requires collaborative partnership to enhance missing capabilities such as managerial capabilities, collaborative capabilities, research, and development capabilities which are important to digital transformation initiatives.

Resources base and infrastructure dimension: The success of digital transformation strategy implementation does not only depend on a clear formulated digital transformation strategy. The process must be completed by complementary assets such as funding, expertise, and technological platforms. Sourcing funds (internal or external) for digital transformation projects paves a clear path into digital transformation in organisation as it enables the organisation to recruit expertise through HR department and promote idea generation through incentives. Rural municipalities need to understand the right information

technologies or digital platforms to invest in. However, this should be aligned to how they want to enhance creation of customer value, strategies, and business model. Digital platforms and tools include connectivity; hardware and software; IoT tools and AI tools; data collection storage and analytical tools; and information systems security platforms.

7.4 Conclusions

There is a significant growth in adoption and use of emerging technologies across different sectors, with private sector leading the way as leading innovators. Organisations are faced with the ever-changing environment, hence, a need to digitally transform their way of operating. Today organisations are now using online-based information systems as a way of responding to societal information technologies demand. Emerging technologies are perceived beneficial for both individuals and municipalities; however, safeness of emerging technologies is still a major concern for citizens. With all positive perception towards emerging technologies towards enhancing organisation performance, rural communities are still faced with a major challenge which may delay the integration emerging technologies into government processes. Developing countries' adoption of digital technologies is still in a lower stage due to organisation lack of necessary capabilities, skill, research, collaboration, and investment on IT infrastructure. On individual perspectives, emerging technologies are perceived as unsafe due to privacy and security issues. However, this study discovered that citizens and departmental managers in rural municipalities believe that the use of emerging technologies in rural municipalities will offer them advantages such as reduced interaction cost and further enhance the quality-of-service delivery. However, due to challenges such as lack of funds, skills, and knowledge towards emerging technologies municipalities rural municipalities are still far behind in digitally transforming their business model. Therefore, this study concludes that, municipalities in rural areas need to take advantage of opportunities presented by emerging technologies to improve service delivery, however, there is a need for change in municipalities. Improved leadership skills, aligning municipalities strategies to emerging technologies, develop and building digital transformation capabilities such as research and development capabilities, collaboration capabilities, absorptive capabilities, and most importantly managerial capabilities.

7.5 Recommendation and Implications

Digital transformation in public sector is a holistic process involving both internal (organisation) and external (citizens). In the context of South Africa, which is characterised by poor service delivery, adoption of emerging technologies has the potential to enhance municipalities

performance and improve quality of service delivery. The following are study recommendations:

Rural municipalities must start designing and implementing programs focused on understanding their citizens by conducting awareness campaigns about emerging technologies. They can also achieve that by talk shows or establishing competitions with incentives aligned to digital transformation.

Municipalities in rural communities need to start building digital transformation capabilities as part of their organisation culture. They also need to allocate funds into their budgeting towards emerging technologies, so that money can be invested into technological resources and infrastructure. Furthermore, there is a need to improve skills and digital transformation skills through collaboration with the private sector and Universities. Rural municipalities need to start investing in academic research by partnering with universities so that knowledge and skills are shared for the benefit of municipalities. Managers, Politicians, and other staff members must be trained and exposed to the right teachings about emerging technologies, thus reducing the digital divide gap. Rural municipalities need to collaborate with private companies and promote outsourcing and skills digital transfers.

7.5.1 Practical Implications.

For rural municipalities to take advantage of potential benefits presented by emerging technologies and further enhance service delivery, there should be changes in institutions such as SITA and prioritise service delivery applications. SALGA also needs to prioritize staff development programs and initiate programs that aim to transform local municipalities digitally. Strengthening the relationship between SALGA, SITA and rural local government and further developing IT-local municipalities performance metrics. This will reduce the lack of implementation of policies.

7.5.2 Policy Implications.

Policy plays an important role in digital transformation initiatives; thus, for rural municipalities to successfully digitally transform their business model, policymakers in the public sector (national and provincial) need to develop actionable policies that will bridge the gap between all business units in rural local municipalities. There must be a link between all relevant business units, such as finances, human resources, operations, and information technologies, thus removing the IT department from isolation. The success of digital transformation depends on the organisation's perception towards the initiative. Therefore, digital transformation in rural municipalities should be a national government initiative rather than a local government

initiative, as it needs a finance department, human resource department operation, etc. Further research on local government information technology policy development and implementation will add more value to rural municipalities' digital transformation initiatives.

7.5.3 Theoretical Implication

Different theories have been developed and used to examine individual and organisational behaviour towards adopting technological innovation. However, integrating multiple theories offers the researcher a more comprehensive understanding of emerging technologies, initiatives, and innovations. Thus, integrating theories such as TAM, UTAUT, DOI, and TOE enabled the researchers to look at the initiative holistically from individual and organisational perspectives. The researcher was able to add construct such as Safety perception, which is a significant construct on emerging technologies such as chatbots and artificial intelligence sensors, due to expendabilities on existing theories. However, the researcher agrees that future research which include more variable or constructs testing organisation perspective on digital transformation initiatives in local government will be more valuable in the concept of emerging technologies and local municipalities.

7.6 Limitations of the Study.

A mixed-method research design offers the researcher a broader perspective on digital transformation initiatives in local government by looking at both citizens' and managers' perspectives. However, a broader sample size, including employees, policymakers, and politicians, would have benefited the study. The researcher collected data at one round. However, a longitudinal study to enable the researcher to collect data on two rounds would have yielded different results. The study focused on digital transformation in rural municipalities. However, the study could have benefited more by evaluating emerging technologies' adoption in rural and urban local municipalities. The exclusion of the urban local municipalities in this study might affect the study's generalisability even though the researcher is aware that some urban municipalities are facing the same circumstances. The study sample size is largely dominated by youth and that may reflect a biasedness towards youth which might also affects the study results. The researcher examines TAM, UTAUT, DOI and TOE, which are known to be the most used research models in examining individuals' and organisations' behaviour towards the adoption of emerging technologies. However, the study could have benefited more by examining other existing research models and incorporate their constructs into the study conceptual framework for other dimensions of the study results.

7.7 Contribution of the study.

With growing interest into digital transformation in both private and public sector with the aim of enhancing customer value creation, the study adds to the discourse by developing a framework to enable rural municipalities to respond to emerging technologies as disruptors. The study discovered the challenges faced by rural municipalities in adoption of emerging technologies and how leaders in rural municipalities perceive incorporation of digital emerging technologies to their business model. The study further recommends a digital transformation strategic implementation process to rural municipalities to solve the strategic issues raised as challenge into digital transformation in rural municipalities. The study adds to the digital transformation in public sector discourse by recommending the digital transformation capabilities required to reduce the capabilities gap and enhance missing capabilities in rural municipalities. On citizens perspectives, the study adds to one the most researched and interesting area of digital transformation and people/ users. Literature in both chapter 2 and 3, shows that multiple research projects has been done to understand determinants factors of user behaviour to use and actual use of emerging technological innovation.

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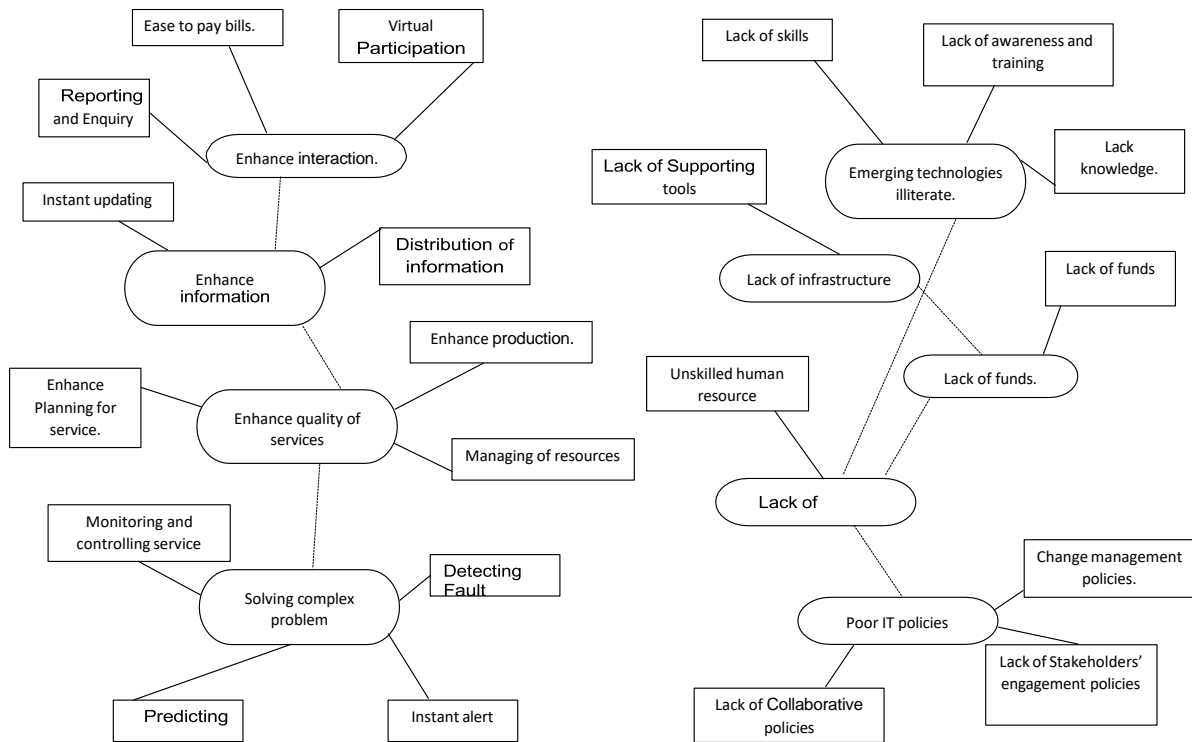
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Annexture 1a: Initial code generation.



Annexture 1b: Theme reporting.

<i>Themes</i>	<i>Sub-themes</i>	<i>A few selected themes quote.</i>

- *Enhance interactions between government-citizens.*

"For instance, if you talk about payment systems, where members of the community would want to pay for services, they would be able to do that even when they are at home, and it becomes cheaper complaints pay for services, even when they have got complaints they can be able to raise or report those complaints sited at home, it will also then fasten the process of response."

- *Enhancing community and stakeholder government participation.*

"It will change how we're doing things in a sense that it must change how we respond as a business to the issues in communities. How we're doing our IDP? How we're preparing our budgets. How we're communicating back towards communities, in terms of preparing our IDP, our budgets, how we're implementing our projects, how they must interact with us in terms of responding to those projects".

- *Enhance government communications.*

"Even our stakeholders who are outside these committees participate in that committee remotely. It's not like in the past when we relied on paper communications. These technologies are good and quick for us to communicate with stakeholders."

- *Enhance the municipality's performance.*

So, if you are to build a reservoir, it takes the municipality 2024 months, but when using the three 3D technologies, you can build a

reservoir within a week rather than within 24. This means that you can automatically deliver on time, thus improving the issue of service delivery. So, if you are saying 24 months, you cut it into a week, which means automatically, the other remaining 11 months, you can focus on other projects.

"So, when we are planning to use those tools, we will also be able to understand the settlement patterns and what is needed in that pattern."

"And sometimes, if you go deeper into artificial intelligence, it can also be used to detect problems, for instance, when you talk about the water leaks, and so on, it can detect those leaks wherever they are using these technologies."

- *Emerging technologies illiterate and digital divide.*

"And now I've got a council compliment that doesn't understand. I can have these good ideas, but then they won't be implemented. Because those people, they don't understand. It's not like they're delaying or whatever".

- *Enhance the quality-of-service delivery.*

"I think the first thing is awareness, to make people aware of the existence of technologies."

- *Deficiency of digital transformation expertise and technical capabilities.*

- *Monitoring and controlling services supply systems.*

"That's why in the institution, you want your business analyst to assess and give a prediction that in the next five years, this business must be at this stage. Like what banks do if you look at the banks, you will realize that after two years, banks change their setup, such as ATM infrastructure; those are the results of people who are assessing. So, I believe that municipalities need something like that: people who will tell us that our current business processes might no longer be effective in the next five years. That will also assist us in planning and having these effective plans".

- *Lack of emerging technologies awareness and training*

"The same point I'm referring to say we do not have enough human resources."

Yeah. The major challenge is that internally, I must buy the technologies. Then, the financial part of it becomes a problem.

- *Lack of resources*

"We have a water pumping system in Musina, and in that area, there is no network connectivity; you can only communicate using Zimbabwean ISP (Simard and airtime).

"Another cause of the delay is that people who need to give a green light to approve

the implementation don't understand."

"So that when I go into the actual implementation, it must guide the relationship I should have with the private sector."

"If you can check, there's nothing at all in there; I think it's only UJ that implemented. I think a four-room using the three 3D in the whole country, so I will say the country, South Africa, we're not, we're not yet ready".

- *Unclear implementation strategies.*

- *Deficiency of external associates and research*

- *Lack of financial support.*

- *Lack of emerging technologies supporting infrastructure.*
- *Poor Information Technologies Policies.*

Appendix B: QUESTIONNAIRE

Demographic Information of Individuals

1. **Age.** Between 18 and 25 Between 25 and 35 Between 35 and 45 Between 45 and 55 Between 55 and 65.
2. **Gender.** Male Female
3. **Level of Education.** Below Grade 12 Grade 12 College diploma University Degree Post Graduate.

Access to Compute and Internet.

- 1 Do you have access to the Internet?
 Yes

No

2 Do you have a smart phone?

Yes

No

3 Do you have social media account?

Yes

No

4 Do you have any other account such as email or online shopping?

Yes

No

5 Apart from smart phones what are other mobile devices do you own? Choose all that applies. Laptop IPad Tablet

Interaction with local government

1. How do you communicate with local government? **Choose all that applies.**

Text Messages (sms)

Telephone Call

Email

Office Visit.

2. How do you rate the use of electronic device (Computers and Internet in local government)?

Poor

Fair

Better

3. Do you wish to see local government to offer 24/24 services a day through the help of Information Communication Technology?

Yes

No.

4. Which channel of communication you would like local government to introduce for applying basic services and reporting problems? **Choose all that applies.**

Facebook WhatsApp Chatsbots

Citizens Perception on Computers, Internet and 4.0 technologies (SA-Strongly Agree, A-Agree, N-Neutral, D-Disagree and SD-Strongly Disagree).

	SA	A	N	D	SD
1. The use of computer and internet will improve service delivery					
2. I have no problem sharing my personal information with local government					
3. The off-counter method of interaction is time consuming					
4. I have no problem with local government accessing my social media accounts.					
5. I would like to see local government introduce self-serving tools such as chatsbots					
6. I have no problem with local government creating my own profile based on my personal information.					
7. I have no problem with my personal information saved on the cloud					
8. Accessing local government services from the cloud will improve service delivery					
9. Local government is on the right track adopting emerging technologies.					
10. I believe that integrating local government with my social media account will improve transparency.					
11. I believe that local government are investing well on Information Communication Technologies.					
12. I believe that local government have the right people to manage ICT Innovation.					
13. I believe that accessing public services and communication will positively impact my life					
14. Using predictive tools to foresee future events will enhance local government service delivery.					
15. Reducing the amount of task human does in local government will improve service delivery.					
16. I would like to have my online local government account.					
17. I have no problem with local government accessing my location with the help of Internet of Thing attached to my smartphone.					

Thank You.

Appendix C: Interview Guide.

Good day! My name is Netshirando Vusani, and I am a PhD Student at the University of Venda. I am conducting research on digital framework for redefining South African local government service delivery. As a relevant person in one of local government in South Africa, I am inviting you to participant in the Interview in relation to the topic above. The interview will take between 30-40 minutes of your time. This is research is for academic purpose, therefore there are no compensation for responding.

Please answer all questions as honest as possible.

- What do you understand by emerging technologies (mobile platforms, BI, AI, Cloud Computing and IoT)?
- How do you think emerging technologies are changing the nature of work in workplaces?
- Are they any other challenges and challenges aligned with emerging technologies?
- How do you think emerging technologies (can improve service delivery?
- What do you think is the reason local municipalities are delaying adoption of emerging technologies as part of service delivery model?
- What value do you think emerging technologies can add into local government and service delivery?
- What do you think local municipality can do to take advantage of emerging technologies?

Appendix C: PARTICIPANT LETTER OF INFORMATION

My name is Netshirando Vusani, a postgraduate student doing PhD of Commerce in Business Information Systems at the University of Venda in South Africa. I am currently conducting a study entitled: “digital framework for redefining South African local government service delivery. **This study investigates “digital innovative solutions in redefining South African local government services delivery model” with an aim of proposing a digital business model framework for the South African local government.**

The study reviews the concept on digital transformation in public sector and innovating business model through adopting destructing technologies such as IoT, Cloud Computing, Predictive Analysis tool and Artificial Intelligence. I am therefore kindly inviting you to participate in this study.

The following ethical conditions and procedures (together with those in the consent letter below) will be followed: permission to conduct this study was sought from the University of Venda Ethical Committee; a consent letter will be presented to all participants to this study, who are required to familiarise themselves with the scope and purpose of the study and their rights before participation. Also, note that your participation in this study is voluntary and

valuable to its successful completion. Please note that this is an academic research and that there are no financial rewards for participation. Should you feel that you are unable to continue for some reasons, you may withdraw at any time. The data being collected is anonymous and will be treated with high degree of confidentiality. All data being collected contributes towards the right-up of the final dissertation and will be presentment generically and anonymously.

If you agree to participate, please answer the research questions on the questionnaire. On average this questionnaire will take between 15-20 minutes to completion.

I thank you for your participation in this study and marking it a success.

If you have any concerns, you are free to contact myself or my research supervisor on the details bellow:

Researcher name: Netshirando Vusani

Email: vnetshirando@gmail.com/vnetshirando@yahoo.com

Phone: 076 846 2226

Research Promoter: Dr W. Munyoka

Email: Willard.munyoka@univen.ac.za

Co-Promoter: Prof A. Kadyamatimba.

Email: Armstrong.Kadyamatimba@univen.ac.za.

Appendix E: CONSENT

Statement of Agreement to Participate in the Research Study:

- I.....hereby confirm that I have been informed by the researcher, NETSHIRANDO VUSANI, about the nature, conduct, benefits and risks of this study - Research Ethics Clearance Number: __,
- I have also received, read and understood the above written information (Participant Letter of Information) regarding the study.
- I am aware that the results of the study, including personal details regarding my gender, age and level of education will be anonymously processed in the dissertation.
- In view of the requirements of research, I agree that the data collected during this study can be processed in a computerized system by the researcher.
- I am free at any stage, without prejudice, withdraw my consent and participation in the study.
- I have had sufficient opportunity to ask questions and (of my own free will) declare myself prepared to participate in the study.
- I understand that significant new findings developed during this research which may relate to my participation will be made available to me on request.

Full Name of Participant Date Time Signature

I,

NETSHIRANDO VUSANI, herewith confirm that the above participant has been fully Informed about the nature, conduct and risks of the above study.

Full Name of Researcher Date.....

Full Name of Witness (If applicable) Date

Full Name of Legal Guardian (If applicable) Date.....

Appendix F: Research Budget

Proposed budget for the study			
ITEMS		Sub-total	TOTAL
Stationary		R4 344.94	
Highlighter 4pk	R29.99		
Pen Ballpoint X4	R30.00		
Copy paper 5XSingle pk. X 2	R600.00		
Book Bag	R34.99		
Staples pins /pk x 5	R150.00		
Vodacom data bundles and airtime	R3 500.00		
Equipment		R2000.00	
Stapler	R 400		
Voice Recorder	1600		
Travelling		R17000.00	
Thohoyandou to Mpumalanga (1 Week).	R5000.00		
Thohoyandou to North West (1 Week).	R 5000.00		
Thohoyandou to Free State (1 Week)	R 7000.00		

Accommodation		R6 900.00	
Lodge (bed and breakfast)			
<ul style="list-style-type: none"> • Mpumalanga (1 Week) 	R4000.00		
<ul style="list-style-type: none"> • North West (1 Week). 	R 4000.00		
<ul style="list-style-type: none"> • Free State (1 Week) 	R 5000.00		
Bed, Meals & Refreshments		R13000.00	
Research @ R120 per day 9 days			
Printing		R7 674.00	
Printing of final proposal @R3 X 28	R84.00		
Printing of questionnaire 400 Copies, 6 pages each @R3/page	R7 200.00		
Printing of final dissertation @R3 X 130 pages	R390.00		
Editing		R4 560.00	
Proposal editing @ R30 X 22 pages	R660.00		
Proof reading (Final research) @130 pages	R3 900.00		
Binding		R2 250.00	
Spiral Binding @R 70 X 5 Copies	R350.00		
Book binding (Final research) @R 380 X 5	R1 900.00		
Grand Total			R50054.94