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Adoption of Knowledge Management Systems by South African municipalities: A Technology-Organizational-Environment (TOE) Perspective

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ABSTRACT

The purpose of this study was to assess the extent to which South African municipalities have adopted the use of knowledge management systems. The study was also aimed at explaining the reasons behind the adoption of these systems. As knowledge management systems are there to enable the use of knowledge management in organizations, the adoption of knowledge management practice was briefly reviewed.

The causal factors that enable or inhibit such adoption were explained. The focus of the research was both descriptive and explanatory. Within municipalities, questionnaires through an on-line system, were sent to senior managers/executives such as Chief Financial Officers or Chief Information Officers or Knowledge and Information Officers. Questionnaires were sent to all 281 South African municipalities. 93 responses were received from these municipalities. Although the target respondents were the heads of departments with municipalities, some responses were from the category "other".

The research paradigm that was employed was a positivist approach.. The research was based on a firm-level theory, called the Technology-Organisational-Environmental(TOE) model. This model was chosen, after a comparison with other theories such as Diffusion on Innovation, Institutional theory and lacovou et al model.

The results on the extent of adoption of knowledge management systems showed that half of the municipalities that responded to the questionnaire have adopted some form of knowledge management systems. The results of the type of knowledge management systems adopted showed that more than 50% of the municipalities that responded have adopted at least one knowledge management system. The discrepancy can be attributed to the understanding of knowledge management systems by some of the respondents. The hypotheses that were supported were that size has a positive correlation to the adoption of knowledge management systems, and that the complexity of the knowledge management system has a negative relationship to the adoption of knowledge management systems. Relative advantage and compatibility were partially supported, while cost, top management support, maturity and stakeholder pressure were not supported.

The implications for practice are successful adoption of knowledge management systems are that the systems to be adopted must be usable and less complex, must be compatible with other

legacy systems in the organisation and that the benefits that these systems bring to organisation must be clearly communicated. Implications for academia are that both the technology and organisational factors play a crucial role in the adoption of knowledge management systems in the South African context.

***Key words**: Knowledge Management, Knowledge Management Systems(KMS), TOE framework; Local Government, Municipalities, Organizational adoption, ICT Systems, Geographic Information Systems(GIS)*

CHAPTER 1: INTRODUCTION

1.1 Overview of the chapter

This chapter begins by outlining the local government context in South Africa. Different provinces are mentioned and the regulatory and legislative framework that governs municipalities is discussed. This is then followed by the definition of knowledge management ,knowledge management systems and the adoption of these systems by municipalities. The roadmap of the research is then mentioned, followed by problem statement, research questions, and the aims as well as the objectives of the study. The chapter concludes by outlining the structure of the entire report.

1.2 South African municipal context

South Africa has nine provinces which are Gauteng, Kwazulu-Natal, Limpopo, Mpumalanga, Western Cape, Eastern Cape, North West, Free State and North West. The provinces of Gauteng, Eastern Cape, Western Cape, Kwazulu-Natal and Free State have metropolitan municipalities. Metropolitan municipalities are the biggest municipalities. South African metropolitan municipalities are Johannesburg, Tshwane, Ekurhuleni, City of Cape Town, Nelson Mandela Municipality, EThekwini Municipality and Mangaung Municipality. In addition to the metropolitan municipalities all provinces have district and local municipalities. District municipalities are responsible for the development of infrastructure, while local municipalities are closer to the residents and are responsible for the provision of electricity, water and sanitation, maintenance of social amenities such roads, parks, halls as well as the collection of levies and rates. Within provinces, municipalities answer to the department of Co-operative Governance and Traditional Affairs. (Venter, Van Der Walt, Phutiagae, Khalo, Van Niekerk & Nealer;2007).

There is a very strong regulatory and legislative framework that govern South African local government. While there is a number of laws in the municipal space, the key ones are briefly discussed.

- The Municipal Demarcation Act 27 of 1996 act defines the boundaries and wards of municipalities (Venter et al,2007).

- The Municipal Structures Act 117 of 1998(as amended in 1999 and 2000) makes provision for the categories and types of municipalities, the establishment of municipalities and the electoral system (Venter et al,2007).
- Municipal Systems Act 32 of 2000 deals with integrated development planning, community involvement, performance management, municipal services and debt control (Venter et al,2007).
- Municipal Property Rates Act 6 of 2004 regulates the power of a municipality to impose rates on property (Venter et al,2007).
- The Municipal Finance Management Act 56 of 2003 provides a foundation for orderly and sound financial management principles and practices in the local sphere of government (Venter et al,2007).

Given the role of the municipality, information and communication technology thus plays an important role in the administration and management of all, if not most, activities of the municipality. It can therefore be argued that in addition to other important IT applications, the role of knowledge management systems within municipalities is paramount. Despite the crucial role that knowledge management systems can play in the municipality, the information on the adoption of knowledge management systems by the same municipalities, with the exception of Johannesburg and Stellenbosch, is extremely limited. This research therefore undertakes to investigate the cause of the shortage of the information that pertains to the adoption of these systems. The research also digs deeper on the factors that contribute to the adoption or non-adoption of these systems. By so doing the research that closes the gap on the availability of literature with regard to the knowledge management systems in the South African local government and it also has practical recommendations on the factors that need to be put in place for knowledge management systems to be adopted. Before the research on the adoption of knowledge management systems by municipality is discussed further, both knowledge management and knowledge management systems will be defined

1.3 Knowledge management

A catalogue of processes, measures and toolkit within an organisation, store and disseminate knowledge within an enterprise or organisation is known as knowledge management (Chaffey & White). According to Mbhalati (2012), the interest in the knowledge management system gained momentum in the 80s although its practice started in the 40s. Consequently, a number

of organizations have developed interest in the adoption of knowledge management practice for their benefit (Assegaff & Hussin, 2012). Coupled to this, there has been a lot of excitement and interest across all industries in the acquisition and implementation of knowledge management systems in order to enable the knowledge management function (Assegaff & Hussin, 2012). Knowledge management programmes are being developed in a variety of industries from service –based firms, including government to product-based ones (Marchand, Davenport & Dickson, 2000). Having spoken briefly about knowledge management, it thus important to define knowledge management systems.

1.4 Knowledge management systems

Different authors have different definitions of knowledge management systems. Alavi & Leidner (2001) define knowledge management systems as the class of information systems that support the construction, sharing and application of knowledge in organisations. Assegaff & Hussin (2012) refer to knowledge systems as information technologies that enable organisations to manage their knowledge efficiently. Avram (2005), while referring to knowledge management systems as knowledge based systems, defines them as systems that implement the heuristic human reasoning through specific techniques, procedures and mechanisms, in order to solve problems that do not have a traditional algorithmic solution. These systems are defined by Hassan, Hayayisuh & Nouri (2011)as those computer systems that help with the keeping of knowledge that help organisations to execute their mandate thus enabling them to achieve their strategic goals and objectives. While all the definitions mentioned above, this report will base knowledge management systems on the definition by Alavi & Leidner (2001). Examples of knowledge management systems include, but are not limited to, the intranet, document management system, content management systems, business intelligence systems and expert systems (Mathi, 2005; Alavi & Leidner, 2001). For the purpose of this research, the survey of the knowledge management systems will be limited to the afore-mentioned categories.

The literature abounds that support the uptake of knowledge management systems by both private and public organizations in other countries around the world, including municipalities (Marchard et al, 2000). The South African local government has, over the years, identified ICT as an enabler in their business and the importance of knowledge management systems has been

mentioned as well, as evidenced by the strategic plan of the South African Local Government Association (SALGA, 2012).

1.5 Extent of adoption

Various categories of knowledge management systems are described and listed. The study then assessed the number of municipalities that have adopted at least one knowledge management system within them. While the extent of adoption primarily focusses on the number of municipalities that have adopted at least on one system as a percentage of all surveyed municipalities, it also measured the extent of adoption of knowledge management systems within these municipalities. The extent of adoption refers to the departments within each municipality that are using knowledge management systems. The Lickert scale of 1 to 5 was used where 1 denotes no adoption and 5 means all departments have adopted some form of knowledge management system.

1.5.1 Factors that contribute to the adoption of knowledge management systems

After assessing a number of models/theories the study used the Technology Organisation Environment (TOE) theory to determine and explain the causes of the adoption of knowledge management systems. The TOE theory has three contexts of technology, organisation and environment and each of which has a number of constructs. The impact of each construct or independent variable on the dependent variable was assessed using correlation analysis. The impact of each construct on the overall adoption of knowledge management systems was then assessed using multiple regression analysis.

The context of the study was South African local government. While some studies have been conducted on individual municipalities in South Africa and other countries on the adoption of knowledge management systems, there is no holistic picture on the South African local government about the adoption of these system. This study, therefore, aimed to fill this gap. The results of the study have both a practical and academic implications. On the practical side, it outlined factors that managers and ICT practitioners must bear in mind when considering implementing knowledge management systems within municipalities. On the theoretical side, it explains the reasons behind the adoption of knowledge management systems by South African municipalities. The limitations of the research were the availability of the respondents, the business period of the research and the sample of respondents.

This study has been initiated in order to assess the extent to which this technology has been adopted and implemented by South African municipalities as part of their enablement of the knowledge management function within them. The process to conduct and conclude the study is outlined below.

1.6 Overview of the research roadmap

All 281 municipalities were chosen. Within the municipalities the respondents chosen were the heads of the departments such as Chief Financial Officers, Chief Information officers, etc. Data is to be collected using an on-line questionnaire through a tool called FreeOnlineSurveys which is to be administered through the email system. The obtained data is then analysed using IBM SPSS Statistics Version 2.4. As part of collecting data, respondents are then informed of their right to participate and to withdraw from the study should there so feel The study has have both academic and practical significance. ICT practitioners will understand the factors that contribute to the uptake of knowledge management systems and will ensure that these are in place in order to address issues of possible low adoption. The results of the study will contribute to the literature on the factors that contribute to the adoption of knowledge management systems in South African municipalities.

1.7 Problem Statement

Knowledge management systems are important systems that help management to understand trends in their business so that they can make decisions. However, in a South African municipality context the literature on the extent of adoption of knowledge management systems by municipalities is not enough. At the same time the literature is silent on the reasons behind the adoption or non-adoption of knowledge management systems by South African municipalities. While the research will endeavour to answer the extent of adoption, the main problem that the research will attempt to answer are the reasons behind the adoption or non-adoption of these systems by municipalities.

The initiatives within organisations to manage knowledge are gaining momentum and a number of organisations are making substantial investments in implementing concomitant computer systems to enable and support knowledge management (Hahn & Subramani, 2000). The significance of these systems has escalated to strategic levels to the extent that their successful deployment can now define or impact the success of the organisation (Karadsheh,

Mansour, Alhawari, Azar & El-Bathy, 2009). In South Africa, strategic plans of some organizations and state-owned entities include the implementation of knowledge management and one or two concomitant systems and technologies like the intranet, business intelligence and document management systems (Mothamaha & Govender, 2014; Gaffoor & Cloete, 2010). Despite the inclusion of knowledge management practice implementation in the strategic and corporate plans, the complete and comprehensive picture of the adoption of enabling technologies, as well as their attendant enablers, by South African local government in particular is not documented. This research will assess and quantify the adoption of knowledge management enabling systems and technology by South African local government. Additionally, this research will also explore and explain the factors that contribute to the uptake of the knowledge management systems using the Technology Organisation Environment(TOE) Framework.

1.8 Value and Significance of the Study

The study will fill the void that exist in the literature on the reasons behind the adoption of knowledge management systems by South African municipalities and will also assist senior managers within South African municipalities to devise strategies to increase the adoption and use of knowledge management systems within their municipalities. The study will also provide background on which further research on knowledge managements systems and artificial intelligence in South African can be done.

1.9 Delineation of the study

While the adoption knowledge management and knowledge management systems have been studied in the Johanesburg and Stellenbosch municipalities, the full extent of adoption across the entire South African municipal landscape is not known. Coupled to the extent of adoption, the factors that contribute to the adoption of knowledge management systems have not been identified and explained. The study thus seeks to address both the extent of adoption as well as the contributing factors in the South African municipalities only. National and provincial government as well as state owned entities are excluded from the study.

1.10 Research Questions

The research questions are divided into two. The first part surveys the extent of adoption of knowledge management systems. It attempts to answer the question

- How many municipalities, among the ones that have responded, that have adopted at least one knowledge management system?

The second part of the research was aimed at answering the following questions:

- To what extent has ***technology factors*** within municipality influenced the adoption of knowledge management systems?
- To what extent has ***organizational factors*** within these municipalities influenced the adoption of knowledge management systems?
- To what extent has environment ***factors*** influenced the adoption of knowledge management systems?

1.11 Aims and objectives of the study

The aim of the study is to fill the gap that exists in the literature on the reasons behind the uptake of knowledge management systems by South African municipalities. The other aim is to recommend practical strategies that managers within South African municipalities need to employ in order to enhance the uptake of these systems within their organisations.

The objectives of this study are a) to assess the extent of adoption of knowledge management systems by South African municipalities and b) to test the effectiveness and impact of the technological, organizational and environmental factors in the adoption of knowledge management systems by South African municipalities.

1.12 Structure of the report

The rest of the report is structured in the following fashion:

Chapter 2 reviews the literature about the adoption of knowledge management systems across a number of sectors from a number of authors. The chapter also discusses different technology adoption theories, such Diffusion on Innovation, Institutional Theory, lacovou et al model and the TOE framework. After the comparing and contrasting the aforementioned theories, the

TOE framework was chosen as the basis of the research model. The chapter concludes by discussing composite constructs of the model.

Chapter 3 discusses the design as well as the methodology that was used in the research. A mention was made of the paradigm that was used, which is the positivist paradigm. The sampling strategy, data collection methods and the data analysis strategy that were used are explained in detail. The chapter closes by mentioning ethical considerations that underpinned the data collection process.

Chapter 4 analyses the data that was collected. Both the descriptive and inferential data is analysed and graphs and other tools are used. Hypothesis testing is done, followed by a revised model. The chapter concludes by conducting and depicting the results of the regression analysis.

Chapter 5 discusses and explains the results obtained in chapter 4. It mentions supported, partially supported and unsupported hypotheses. The chapter also relates the results of the different hypotheses to the existing literature.

Chapter 6 revisits the three research questions against the results of the research. It then summarises the findings and deliberated on the implications for both practice and academia. It concludes by highlighting the limitations of the research and the areas that future research, on the same subject and context, will have to focus on.

1.13 Conclusion

This concludes the introductory chapter of the report.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This chapter reviews the literature about the adoption of knowledge management systems across a number of sectors from a number of authors. Strengths and weaknesses of the different firm-level technology adoption theories, such as Diffusion on Innovation, Institutional Theory, lacovou et al model and the TOE framework are discussed. The independent variable which is the adoption of knowledge management systems, is discussed using the views and perspectives of a number of authors in the subject. The TOE framework was selected as the basis of the research model leading to the formulation of the conceptual model for the study. The chapter concludes by discussing constructs of the model.

The causes of the successes and failures of the adoption of the knowledge management were studied from the existing literature. These were followed by a deeper assessment of the adoption of the supporting technology, called knowledge management systems, by organizations in general, and select cases of the adoption by local government in particular were discussed.

This means that the adoption of ICT systems should also be viewed against a background of holistic knowledge management philosophy, and other moderating variables should be considered (Assegaff & Hussin, 2012).

A study conducted by LGAT in 2003 showed a serious lack of knowledge management systems in some municipalities in Australia. It showed that knowledge was mostly resident in the minds of employees and knowledge management as a practice was still foreign. Information was still stored in operational systems and databases and there were no structures and ICT systems that could be classified as Knowledge Management Systems (LGAT, 2003).

On the other hand, a classic example of the adoption of knowledge management was demonstrated by Omona et al (2012). The researchers conducted a study on the adoption of knowledge management systems with institutions of higher learning in Uganda. The results of the study demonstrated that most universities had not only adopted knowledge management practice, but they had adopted supporting systems as well. The results showed that technologies such as Groupware, Document Management Systems, Knowledge Portal, academic publishing,

Learning Management Systems were being used by all universities as part of the ICT that enabled knowledge management (Omona et al, 2012).

A study conducted by Evangelista, Esposito, Lauro & Raffa (2010) on the small business adoption of knowledge management systems in Italy demonstrated that in a sample of ninety companies surveyed, 83% had knowledge management systems in place. 73% of these had adopted an internal knowledge management system for internal use. Knowledge management systems supporting the internal and external management of knowledge flows were implemented in four firms. In all these companies the internet and work teams were listed as the most prevalent forms of knowledge management systems.

The literature that is available supports the adoption of knowledge management by organizations around the world, including the central and local government. In the South African context studies have been conducted on the adoption of general knowledge management by big organizations such as banks, and some studies have focussed on individual big municipalities like Stellenbosch and Johannesburg (Mothamaha & Govender, 2014; Gafforo & Cloete, 2010). For example, the City of Johannesburg has made good progress in the adoption of the Knowledge Management Systems in support of its knowledge management initiatives. The same city has implemented knowledge management in its Rea Vaya section, Social Development, City Parks, Public Health and has established what it calls the Johannesburg Innovation and Knowledge Exchange. Although some of these entities are still implementing their knowledge management systems, others like the Social Development department have in-house knowledge repositories (Mothamaha & Govender, 2014). The Stellenbosch municipality is also a good example in the adoption of knowledge management systems to support knowledge management. The municipality has a document management system, intranet, a Geographic Information Systems, e-library and a South African Municipal Resource Administration as part of its knowledge management systems (Gaffoor & Cloete, 2010).

However, the full and comprehensive picture on the extent to which all levels of South African local government had adopted knowledge management systems, had hitherto been non-existent. Hence, the results of this research describes fully the extent of adoption, together with its attendant reasons, of these knowledge management systems by South African municipalities.

2.2 Theoretical Background

The aim of this research was to determine the extent of adoption knowledge management systems, in support of knowledge management, by South African local government, as well as to assess the efficacy of the technological, organizational and environmental factors in the adoption of knowledge management systems. The results of the research also determined and quantified the factors that influenced the extent of adoption. An effort was invested to find a suitable theory or model to explain the reasons behind the level of adoption.

In order to find the right theory and/or model for understanding technology adoption at an organizational level, four firm-level technology adoption theories/models were discussed. Oliviera and Martins (2011) mentioned the Roger's (1995) Diffusion of Innovation Theory and Tornasky and Fleischer's (1990) TOE framework as the two most widely accepted, and which have been found to be useful in understanding organizational-level technology adoption. The other two firm-level adoption theories namely, Institutional Theory and the Iacovou et al were also reviewed. Below is a synopsis of each of these theories:

- The **Diffusion of Innovation(DOI)** theory (Rogers,1995) is characterised by the modalities, the reasons and the speed with which novel ideas, innovations and technology are disseminated through cultures, from both an individual and organisational level (Oliviera & Martins, 2011). According to this theory the decision to adopt new technology or innovation is driven by the strength of the internal leadership as well as internal and external culture.

- The **Institutional Theory** (Scott & Christensen, 1995) is predicated on the fact that institutional environments are crucial in shaping the organizational structure and the execution of its mandate. It states that social and cultural factors, as well as concerns for legitimacy also play a role in organizational decisions, in addition to efficiency and rational internal goals. According to this theory the decision to adopt an innovation or technology is driven by mimetic, coercive and normative forces that exist in the environment.

- Authors Iacovou, Benbasat and Dexter (1995) developed a firm-level technology adoption model, called, **Iacovou et al model**, specifically focussing on the adoption of EDI systems by small and medium enterprises. The key tenets of the model are the

perceived benefits of the innovation or technology, organizational readiness and external pressure. Perceived benefits comprise of internal and external benefits. Musawa & Wahab (2012) studied the adoption of EDI by 206 Nigerian small business, using the Iacovou et al model. Their results demonstrated that the adoption of EDI by Nigerian small business was due primarily to external factors. The conclusion was that the model is effective in studying technology adoption, when the technology links an entity with its business partners.

- The **Technology-Organization-Environmental** (***TOE) framework***, developed by Tornatzky and Fleischer (1990) identified the technological, organizational and environmental contexts as factors that influence the technological adoption by organizations. Technological contexts include both internal readiness and external influence on technology. Organisational contexts entails the size of the organisation, internal processes, willingness to learn, support from senior management, structure and communication processes. Environmental factors include government regulation, competitors, suppliers, business partners and the industry as a whole.

2.3 Comparison of the theories/models

The Iacovou et al model is premised on perceived benefits, organisational readiness and external factors as determinants of the adoption of technology by organisations. This model has been successfully applied in the study of the adoption of EDI and e-commerce by small businesses (Musawa& Wahab, 2012; Iacovou et al, 1995). The results of the studies have concluded that the main primary factor that leads to adoption of inter-organisational systems by small business is the pressure and influence from trading partners (Musawa & Wahab, 2012). The external factor component of the lacovou et al model makes it an ideal theory to study the adoption of interorganizational systems, like the EDI and e-commerce, by small businesses. In the context, of municipal knowledge management systems, this theory is not recommended since these systems are not interorganizational.

The institutional theory is based on internal organisational human and external human factors, The focus of this theory is on the fact that adoption of innovation or technology at firm-level can be explained using socio-cultural factors only. The internal organisational and external factors of this theory are comparable to those of the Iacovou et al model. However, this theory

does not have technology context. This theory is not recommended since it leaves out the technology component, which is key in the study of adoption of knowledge management systems by local government. This theory is also not suitable to study the adoption of knowledge management systems, since mimetic, coercive and normative forces are arguably not applicable in the municipal context especially when ICT systems are concerned.

The diffusion of innovation theory explains adoption using internal cultural characteristics of the organisation, such as organizational conventions, standards, relationship and co-operation between departments, and leader characteristics. The strength of this theory is on the leadership effectiveness and culture of the organisation in the adoption of new innovations. The technology aspect is not included as part of the theory. This theory is not recommended.

The TOE theory explains the adoption of technology and innovation on organisational, technological and environmental factors. The TOE theory encompasses all the variables that are contained in the other theories. The technology part of TOE is comparable to the adoption of interorganizational adoption of systems which is the main characteristic of the lacovou et al theory. The organisational context of the TOE theory covers cultural aspects of both the institutional and diffusion of innovation theories. The environmental context of the TOE model includes some aspects of the institutional and the Iacovou et al theory. Because of its comprehensive nature, in terms of the scope of independent variables, the TOE model is the most appropriate model to study the adoption of knowledge management systems in the municipal context.

The TOE model has also received support in the literature. Oliviera and Martins (2011) then recommended the TOE model as the best model/theory suitable for studying technology adoption at firm level because it incorporates the environmental context and that it enjoys consistent and wide empirical support. They cited examples of studies that employed this model which spanned a number of technologies including Electronic Data Interchange(EDI), open systems, websites, e-commerce/business, Enterprise Resource Planning(ERP) and knowledge management systems. The TOE model was also used by Ozturk, Palakurthi and Hancer (2012) in their study of the organizational-level adoption of the RFID technology in the hospital industry. The rationale behind their choice of this model was that it has a solid theoretical basis, has been widely applied in research and empirically accepted to be apposite for studying firm-level adoption of technological innovation (Ozturk et al, 2012).

Notwithstanding the fact that the TOE model enjoys overwhelming support from researchers studying technology adoption at firm-level, authors Nagy, Collins & Nord (2014), identified a shortcoming of this model. The weakness was that the model did not adequately explain the differences in organizational adoption of technology or innovation among organizations with similar characteristics (Nagy et al, 2014). Hence an additional construct called, organizational ***approach to ICT***, was devised by Nagy et al (2014) to upgrade the current model to an extended TOE version. In this research, this construct was called ICT maturity of the organisation, and was included as part of the organisational context.

After the four frameworks/theories mentioned above were compared and contrasted, and the support of its use was reviewed through the existing literature, the proposed model for the adoption of knowledge management systems in municipalities that was chosen was the TOE model. The choice of this framework was informed and influenced by the fact that the three components of Technology, Organization and Environment are central to technology adoption in general and to knowledge management systems in municipalities in particular. The next section will use the extended TOE model to research the adoption of Knowledge Management systems by municipalities.

2.4. Research Model

Figure1 illustrates the research model

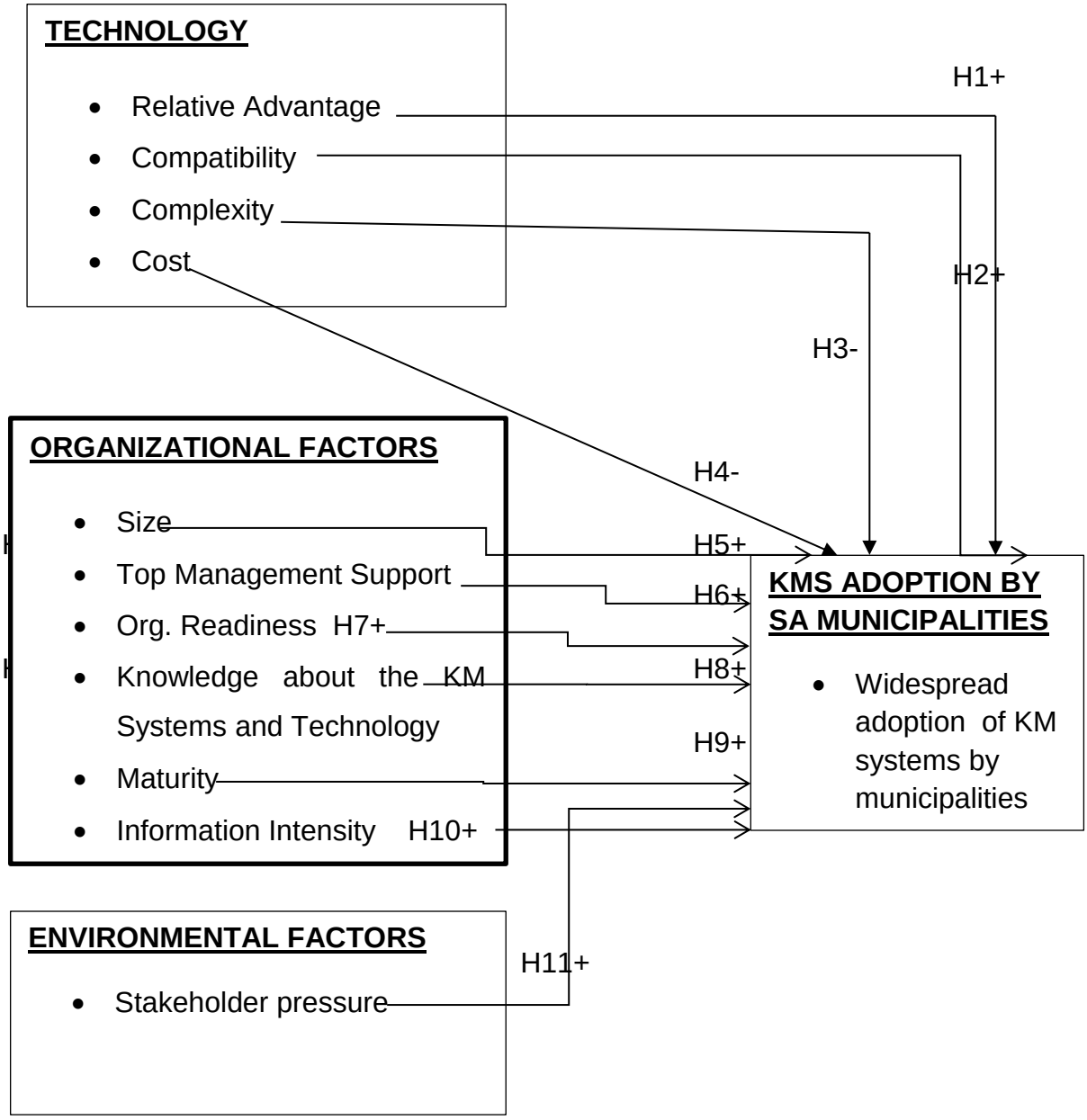


Figure 1: Proposed research model for the adoption of knowledge management systems by South African local government (Adapted from Tornatzky & Fleischer's TOE Model)

The dependent variable, namely the adoption of knowledge management systems by South African municipalities, is discussed first. This is then succeeded by the discussion of the three contexts of technology, organization and environment together with their constituent independent variables.

2.4.1 Adoption of knowledge management systems by municipalities/Firm-level adoption of technology

Before firm-level adoption is discussed it is important that ICT or Innovation adoption is defined.

ICT or innovation adoption is the process through which an individual or other decision-making unit passes from first knowledge of technology or innovation, to forming an attitude towards the technology or innovation, to a decision to adopt or not adopt new idea, and to confirmation of this decision (Rogers,1995). According to Peansupap & Walker (2005), demand-pull and technology –push forces trigger adoption of ICT. The former is when the organization seeks solutions to a particular problem, while the latter is when technology is sold by ICT suppliers to solve a generic problem (Peansupap & Walker, 2005). In a study of the ICT adoption in the construction industry, Penasupap & Walker (2005), indicated that demand-pull can also be associated with a proactive, top-down (driven by senior management) approach from the organization, while the technology-push is linked with both a proactive, top-down and a reactive and bottom-up disposition from the organization.

Adoption is not an event, but a process. According to Chong & Bauer (2000), this process has two stages. The first level is characterised by the purchase, acquisition and uptake by the organization, while the second level pertains to the acceptance by the entire organization. The second level is usually referred to as diffusion. The scope of this research was limited strictly to the adoption of technology and excluded the acquisition thereof by the organization. As a consequence of the definition of adoption from Rogers (1983), adoption in this study refers to the adoption of knowledge management systems by South African municipalities. The extent of adoption is thus a percentage of municipalities that have adopted at least one knowledge management system over all surveyed municipalities.

Firm-level adoption of technology or innovation can be explained by a number of theories and models, depending on the nature of technology as well as the industry in which the organization operates. Since the context in this case is the adoption of knowledge management systems by South African municipalities, the variable of technology or innovation adoption by organizations in general will first be defined and reviewed based on empirical studies and literature.

The next section will then discuss all independent variables.

2.4.2 Technology context

Within the technology context the determinants of relative advantage, compatibility, complexity and cost were identified. Each of these is discussed below.

2.4.2.1 Relative Advantage

It refers to how an organization may perceive new technology as being better or superior to the previous technology that the organisation had (Rogers, 1995; Lippert & Givindarajulu, 2006). Relative advantage touches on the new benefits and advantages that will accrue the organisation once it has acquired and implemented the innovation or technology (Lippert & Givindarajulu, 2006). It is therefore against this background that knowledge management systems may be perceived as offering benefits to organizations, in their aim to manage knowledge within the organizations, as opposed to knowledge being kept in physical documents or part of it being resident in the minds of some employees. Hence the following Hypothesis:

*Hypothesis 1***:** Relative advantage of KM systems will have a positive impact on municipalities' adoption of KM systems.

2.4.2.2 Compatibility

For successful adoption, systems must be compatible with internal work culture of the adopting organisation (Rogers, 1995; Govender & Pretorius, 2015; Findik & Tansel, 2013). In the context of knowledge management systems, it is therefore crucial that these systems are harmonious with the business processes of the adopting municipality, and that there is technology and organisational culture alignment. The importance of this technology and organisational culture fit was also supported by Mangula, Weerd & Brinkkemper (2014). Based on the relationship between compatibility and the adoption of new technology by organization, the following hypothesis is formed.

Hence the following hypothesis:

Hypothesis 2: Compatibility of KM systems will have a positive impact on municipalities' adoption of KM systems.

2.4.2.3 Complexity

Complexity of an innovation relates to the ease of understanding or using the new innovation or technology that has been acquired or implemented (Rogers,1995; Govender & Pretorius, 2015; Tornatzky & Fleisher,1990). According to the authors if the innovation is easy to understand and use, then it will be adopted faster. The complexity of an innovation and the process involved in its implementation negatively influences its adoption (Rogers, 1995). Based on the relationship between complexity and the adoption of new innovation/technology the following hypothesis will be posited:

Hypothesis 3: Complexity of KM systems will have a negative impact on municipalities' adoption of KM systems.

2.4.2.4 Cost

In support of the findings and contentions by both Ozturk (2012) and Rogers (1995), a study of the Swiss business sector revealed that financial and know-how shortcomings are more impactful inhibitors to the adoption of ICT (Hollenstein, 2002). This means that organizations with limited financial resources may be averse to adopting technology, despite its perceived benefits. Findik & Tansel (2013) illustrates that the higher cost of technology is an inhibitor to technology acquisition and its adoption, by citing the example of the SAP system. They state that despite its popularity and usefulness, SAP is not acquired and adopted by small business, but by big businesses because of its high installation costs (Findik & Tansel, 2013). The results from the literature indicate that the cost of technology has an inverse relationship to the adoption of technology.

Hence the following Hypothesis:

Hypothesis 4: Cost of KM systems will have a negative impact on municipalities' adoption of KM systems.

2.4.3. Organizational Context

Within the organizational context the determinants of top management support, organizational readiness, knowledge about knowledge management systems and organizational approach to IT, were identified. Each of these is discussed below.

2.4.3.1 Size of the organisation

The size of an organization refers the number of its employees and its financial resources (Tornatzky & Fleischer, 1990; Oliviera & Martins, 2011). The relationship between size and the uptake of new innovation has received wide support in the literature (Hall & Khan, 2002; Lippert & Govindarajulu, 2006). In the South African municipality context our hypothesis, will be that larger municipalities like metropolitan and district municipalities will have a greater propensity to adopt knowledge management systems, compared to smaller local municipalities. We therefore present the hypothesis:

Hypothesis 5: The larger the size of the municipality, the higher the propensity for the municipality to adopt knowledge management systems.

2.4.3.2. Top Management Support

The positive attitude, and the willingness of executive and senior leadership of the organization to render financial and other resources towards the acquisition and implementation of an innovation or technology is termed top management support (Al Haderi, 2014; Zabadi, 2016; Ozturk et al, 2012; Al-Mamary, Shamsuddin & Aziati; 2014). The role of top management support plays in the uptake and the diffusion of innovation within the organization is paramount (Ozturk et al, 2012; Chong & Bauer, 2000). In support of the importance of top management support, Chong & Bauer (2000) then cites a number of other researchers that emphasize the fact that lack of top executive's support contributes to the failure of the implementation of technology and its intended adoption. Through the ownership and full control of the afore-mentioned resources, senior management can enable the successful implementation and adoption of technology or innovation in the organization. Hence the following Hypothesis:

Hypothesis 6: Top Management Support will have a positive impact on KMS adoption by municipalities.

2.4.3.3. Organizational Readiness

Many studies indicate that organizational readiness is an important variable for innovation adoption (Ozturk et al, 2012). Effective innovation or technology implementation then

happens when organizational resources are availed in preparation for the uptake of the new innovation or technology (Chong & Bauer, 2000).Hence,

Hypothesis 7: Organizational Readiness will have a positive impact on KMS adoption by municipalities.

2.4.3.4. Knowledge about KM Systems

Ozturk et al (2012) demonstrated that the higher knowledge of the RFID system, led to higher adoption of the same technology by the organizations that they studied. To address the shortcomings of the dearth of the knowledge resource, Hollenstein (2002) advocated the implementation of thorough ICT-specific training programmes within companies in the initial stages of technology adoption. In the light of the significance of knowledge about KM systems, the following hypothesis is proposed.

Hypothesis 8: Knowledge about the KM systems will have a positive impact on KMS adoption by municipalities.

2.4.3.5. ICT Maturity of the organisation

Previous experiences with the implementation of technology and the resultant learning constitute the ICT maturity of the organization (Nagy, Collins & Nord, 2014).Maturity refers to the employee mind-set towards technology adoption and the level of employee knowledge, while end user behaviour refers to the attitude of end users towards technology matters. Both the former and the latter constructs influence the organizational adoption of technology (Govender & Pretorius, 2015). This maturity of the organisation explains why similar organizations in the same industry will exhibit different adoption patterns of the same technology. It therefore can be taken to mean that organizations with a positive approach and past positive outcomes to ICT have a higher propensity to adopt ICT innovations that the ones that have a negative approach and have experienced negative past outcomes of ICT implementations and innovations (Nagy, Collins & Nord, 2014). Hence the Hypothesis:

Hypothesis 9: IT Maturity will determine the KMS adoption by municipalities.

2.4.3.6 Information Intensity

Information intensity denotes a situation where an organisation is dependent on up-to-date information in order to carry out its mandate successfully (Oliviera & Martins, 2011). Oliviera

& Martins (2011) state that there is a positive relationship between the uptake of new innovation by the organization that are highly dependent on information. From Ozturk et al (2012) statements, it can be surmised that information intensive organizations would include mostly of service and professional organizations. A municipality is automatically included in that it provides both mainly service and products. The product would include the provision of electricity, water, services, physical buildings, and the service would be on the maintenance of infrastructure, building and other amenities that it owns on behalf of the community. To successfully deliver on the aforementioned, the availability of up-to-date information is crucial.

The hypothesis on information intensity is then formed:

Hypothesis 10: Information intensity will impact the adoption of KMS by municipalities positively.

2.4.4 Environmental Context

Within the environmental context the determinant of stakeholder pressure was identified. This determinant is discussed.

2.4.4.1 Stakeholder Pressure

It is generally believed that the pressure from competition, customers and the regulatory environment increases the likelihood of adoption of technological innovation by the organization (Ozturk et al, 2012; Hollenstein, 2002). Stakeholder pressure can be seen in the companies that are in the same industry. Examples would include the flight agencies in the airline industry, bus companies in the road transport industry, railway companies, hospitals in the medical industries, banks in the financial services industry. Flight agency are forced to adopt systems in order to be connected to different airlines, otherwise they will not be able to deliver services effectively. Banks are also forced to adopt up-to-date systems so that they can conduct their business outside the confines of the business hours, geographic and physical constraints, otherwise they will lose business to their competitors. Hospitals are now in a position to be compelled by the nature of the business to have systems that will connect them to different medical aids companies. The examples can also be cited from all other industries which support the case of different elements of stakeholder pressure in the adoption of new systems. Hence the Hypothesis:

Hypothesis 11: Stakeholder pressure will impact the adoption of KMS by municipalities positively.

Following the discussion of each hypothesis, within the three contexts of technology, organisation and environment a questionnaire was designed. A relationship was illustrated between the contexts, their constructs, hypotheses as well as the items in the questionnaire. The items in the questionnaire were sourced from a number of authors that are listed under each construct.

2.5 Relationship between the proposed model, hypotheses and the questionnaire that was used.

Context	Construct	Hypothesis	Instrument Item,
Technology Context – This refers to sum total of all technologies and related issues that are relevant to the organization(Tornatzky & Fleischer, 1990; Oliveira & Martins , 2011).	**Relative Advantage**	H1	1.Using a KMS would enable the municipality to accomplish tasks more quickly 2..Using a KMS would improve the quality of the work the municipality does 3.Using a KMS would makes it easier for the municipality to do its job 4.Using a KMS would enhance our effectiveness on the job 5.Using a KMS would enhance the municipality's productivity (Tornatzky & Fleischer, 1990; Oliveira & Martins, 2011)
	Compatibility	H2	6.KMS can easily be integrated into our existing IT infrastructure 7.KMS fit well with the way our municipality usually performs 8.KMS fit well with our municipality's work style 9.KMS are compatible with our municipality's norms and culture technology (Tornatzky & Fleischer, 1990; Oliveira & Martins, 2011)
	Complexity	H3	10.Working with a KMS is complicated 11.It takes too long to learn how to use the KMS to make it worth the effort 12.Learning to operate the KMS would be easy for our municipality 13.It takes too much time for us if we want to use a KMS to do our normal duties technology (Tornatzky & Fleischer, 1990; Oliveira & Martins, 2011)

			14.The deployment of a KMS takes a negligible amount of time 15.The deployment of a KMS takes a negligible amount of effort technology (Tornatzky & Fleischer, 1990; Oliveira & Martins, 2011)
	Cost	H4	16.The training costs for a KMS are low technology (Tornatzky & Fleischer, 1990; Oliveira & Martins, 2011)
***Organisational Context* –** This refers to the internal social and cultural characteristics of an organization(Tornatzky & Fleischer, 1990; Oliveira & Martins , 2011).	**Size**	H5	2.Category of the municipality (Metropolitan, District, Local) 3. Approximate number of employees
	Top Management Support –	H6	17.Top managers are willing to try to provide necessary resources for implementing knowledge management practices 18.Top managers often advise employees to keep track of the latest development in KMS and related practices 19.Our top management is likely to consider the implementation of KMS as strategically important technology (Tornatzky & Fleischer, 1990; Oliveira & Martins, 2011)
	Organisational Readiness	H7	20.Our municipality offices are highly computerized with internal and external network that connect them to other offices(technology (Tornatzky & Fleischer, 1990; Oliveira & Martins, 2011) 21.Our municipality has connectivity to the internet

			23.Our municipality has financial resources to implement KMS 25.Most of our employees have unrestricted access to computers (technology (Tornatzky & Fleischer, 1990; Oliveira & Martins, 2011)
	Knowledge about KM Systems and technology	H8	22. Our municipality has individual(s) with 'expert' knowledge of information technology and knowledge management systems 24.Our municipality has individual(s) who could carry out the evaluation of KMS implementation 26.Most of our employees are computer literate (technology (Tornatzky & Fleischer, 1990; Oliveira & Martins, 2011)
	Maturity	H9	27.Our municipality responds well to changes in the business environment 28.In our municipality office, employees can easily accept a change in their organizational roles 29.In our municipality offices, employees can easily accept a change in the software applications that they use in order to exploit new technologies 30.Our municipality is capable of dealing with rapid technological change 31.Attempts to create change in the municipality offices are usually met with resistance (Tornatzky & Fleischer, 1990; Oliveira & Martins , 2011)
	Information Intensity	H10	32.Our municipality is dependent on up-to-date information 33.It is very important for our municipality to access information fast, whenever it needs the information

			34.It is very important for our municipality to have access to reliable, relevant and accurate information (Tornatzky & Fleischer, 1990; Oliveira & Martins, 2011)
Environmental Context -This refers to various external pressures that influence the enterprise's decision to take up an innovation(Tornatzky & Fleischer, 1990; Oliveira & Martins, 2011).	**Stakeholder Pressure**	H11	35.A large number of our suppliers have already adopted a KMS 36.The majority of suppliers recommend the implementation of a KMS 37.Our suppliers usually set the trend of KMS 38.Suppliers are generally very knowledgeable regarding technical matters technology. (Tornatzky & Fleischer, 1990; Oliveira & Martins, 2011)

Table1: TOE Model, Hypotheses and the reference to questionnaire/tool.

The next section outlines the research methodology that was used.

2.6 Conclusion

The four firm-level adoption theories were compared and contracted and the supporting examples were cited. The TOE model was selected as the most appropriate model that is suited for this study, followed by the formulation of the conceptual framework was based on this model. The adoption of knowledge management system as a dependent variable was discussed and the literature on the views of different authors and authorities in the field of technology adoption were reviewed. The dependent variables located within the contexts of technology, organization and environment were discussed. The hypotheses were formulated from the independent variables. The very last end of the chapter illustrated the link between the questionnaire to be used for the study and the independent variables and their sources.

The next chapter discusses the research methodology that was used in planning, designing and execution the study.

CHAPTER 3. RESEARCH METHODOLOGY

3.1. Introduction

This chapter discusses the research methodology that was used in conducting the study. It explains the reasons for choosing the positivist paradigm. The nature of the study being descriptive and explanatory is discussed and the reasons thereof are outlined. An overview of the questionnaire is given. Mention is made of the pretesting and piloting of the questionnaire to ensure reliability and validity of the results and to eliminate ambiguity. The sample is discussed and the sampling strategy is mentioned, including the nature of respondents, and the rationale for choosing it. Data collection methods that were used in planning and executing are described in a fair amount of detail, followed by the description of the data analysis strategy and techniques that were employed. The chapter closes on ethical considerations that were followed, which included obtaining the clearance certificate from the university and of preparing a letter to the intended respondents which appraised them of their rights during the process of participation in the study. The diagram below outlines the research execution plan that was followed.

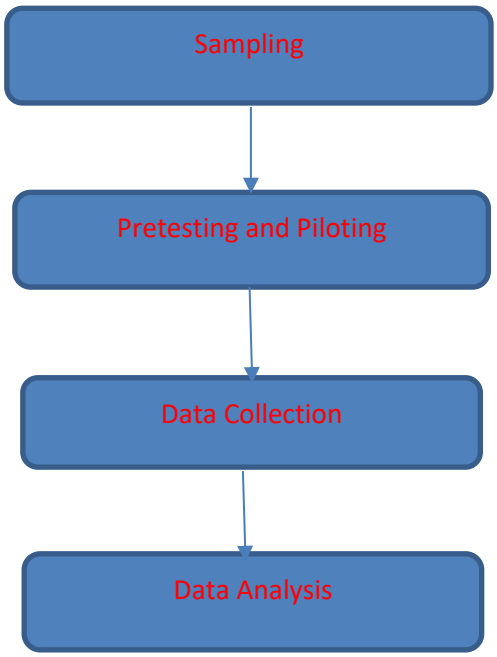


Figure 2: Research Execution Plan

3.2 Research Paradigm

The mental model or frames, belief systems or/and the manner in which individuals view things is called a paradigm (Battacherjee,2012). The researcher's design and conduct is shaped by the very same mental model. From an ontological perspective, the paradigm was influenced by the fact that the researcher prefers that the facts must be deduced independently and objectively and must not be prone to influence by the subjects being interviewed. On the epistemological perspective, the researcher was driven by the fact that only observable phenomena can provide credible and acceptable data and facts. It was therefore on the basis of this thinking that the researcher chose a positivist paradigm, instead of the interpretive paradigm. The positivist paradigm uses a deductive approach to research as it starts with theory and explains the results of the research using the theory. The interpretive paradigm uses an inductive approach that begins with data and concludes with the formulation of the theory (Maree, 2007; Battacherjee, 2012). The nature of the research was therefore aimed at testing the existing adoption theory in the municipality context and possibly refine it, but not to generate a new theory. The TOE model was chosen as a model to be used to study the adoption of knowledge management systems within South African municipalities.

The choice of the paradigm was based on the wide scope of the research and was supported by a research by Korpelairen (2011), which found that out of 52 technology adoption research studies, 47 used a positivist approach. The pertinence of the research paradigm chosen, on conducting surveys of this nature, is supported and was used by Omona et al (2012) in their study of the adoption of knowledge management systems by higher institutions in Uganda. The choice of the paradigm was also informed by the possibility that the findings can be verified and can be generalized to local government in other countries, in both developed and developing world. The extent of adoption of knowledge management systems, in this context, refers to the number of municipalities that have adopted knowledge management systems from the sample of the municipalities that were chosen. Had the study been limited to one municipality and deeper specific reasons for the underlying causes and specifics of that same municipality were to be determined, an interpretivist approach would have been employed.

3.3 Research Design and Methodology

The research was primarily descriptive as its purpose was to assess the extent (number of municipalities) to which the institutions surveyed have adopted the necessary knowledge management systems to support their knowledge management goals, strategy and practices. The findings aimed to determine the number of municipalities that have adopted at least one knowledge management system. The research was also explanatory as the reasons behind the rate of adoption were unpacked, through the use of the TOE model.

Using the TOE model and items from previous studies, a questionnaire was designed and had four sections. The introduction section outlined the purpose of the research and survey.

Section A had the biographical information of the respondent. It included the position of the respondent, the name of the municipality, the category of the municipality, the number of employees of the municipality and province where the municipality is located.

Section B had two sub-sections. The first sub-section had six questions about the existence of the different types of knowledge management systems, and asked if the different type of knowledge management applications exist in the municipality. The different types of knowledge management systems were on the Intranet, Sharepoint or eDocs, Content management system, Geographic Information System and the Business Intelligence System. The last question, among the six, was on the existence on any knowledge management, other than the ones mentioned in the preceding questions. **Nominal scales**, characterised by a "Yes" or "No" for all questions in this section were used. The second sub-section had one question which was measured using a Likert scale of 1 to 5. The extent of adoption of the knowledge management system per municipality was rated from 1 to 5 using the Likert scale, where

1 = No department has adopted any KMS

2 = One or two departments have adopted some form of KMS
3 = Some departments have adopted some form of KMS
4 = Most departments have adopted some form of KMS
5 = All departments have adopted some form of KMS

Section C categorised questions by the three contexts (Technology, Organisation, Environment) and the questions were about the impact of various variables to adoption of the

knowledge management systems. All independent variables were listed and the respondents were asked to rate them on a **Likert scale of 1 to 5**. The questionnaire is attached as Appendix A.

The structure of the questionnaire was as follows

Context	**Constructs**	**Questions**
Technology	Relative Advantage, Compatibility, Complexity, Cost	1-16
Organisational	Top Management support, Organizational Readiness, Knowledge about Systems and Technology, Maturity, Information Intensity	17-34
Environmental	Stakeholder Pressure	35-38

Table 2: Questionnaire Structure

The definition of all variables, the questions and scales were from Tornatzky & Fleischer (1990). The questionnaire was concluded by thanking the respondents for participating in the survey. A copy of the sample questionnaire is attached as **Appendix A.**

3.4 Sampling

A sample can either be probability or non-probability (Olivier, 2009; Battacherjee, 2012;). However, it is possible for the study to use elements of both. The sampling strategy, therefore, that was employed in this research was based on the number of municipalities given their their heterogeneous nature. Prior to mentioning the sampling strategy that was used, the heterogeneity of South African local government is briefly described below.

According to the **2012-2017 SALGA STRATEGY**, South Africa has 281 municipalities. The municipalities are categorised into metropolitan, district and local municipalities. There are 8 metropolitan municipalities, 61 district municipalities and 212 local municipalities. The metropolitan municipalities are Johannesburg, Tshwane, Ethekwini, Nelson Mandela, Buffalo

City, Mangaung and Cape Town. This category of municipalities has biggest budgets and is well resourced in terms of human resources, skills, technology, buildings and vehicles. District municipalities have sizable budgets and there are well resourced, albeit less so than metropolitan municipalities. Local municipalities vary in terms of resourcing, number of employees and locations. Some local municipalities are based in urban areas and some are in rural areas. The political control of South African municipalities is spread across four or five South African political parties. The low number of South African municipalities and their attendant heterogeneity in terms of size, location, resources and political control warranted that the entire 281 municipalities be surveyed, in order to increase the validity of the results. The list of South African municipalities is attached as **Appendix D.**

Had the number of South African municipalities been higher, a combination of probability and non-probability sampling would have been used. Because there are three categories of South African municipalities, quota sampling would have been done first, to ensure that all three categories are represented. Then within each category of the municipality, a random sample, a probability sampling method, would have been employed. However, due the low number of municipalities, all 281 municipalities across the country were surveyed in order to increase the reliability of results. The target respondents were at least one executive per municipality. The level of informants that were targeted in each of these municipalities were senior managers who could either be a Chief Financial Officer, or Chief Information Officer, or Corporate Service Manager or ICT Manager.

3.4.1 Pre-testing and piloting

The pre-testing and piloting od a questionnaire is an important step in the research process as it can detect problems with instrumentation and research design, thus ensuring that the outcome of the study is valid and the toolkit utilised is reliable (Bhattacherjee, 2012). Olivier (2009) asserts that no matter how well the questionnaire has been designed and the questions have been framed, it is still possible for it to have problems, which can confuse respondents. Thus pre-testing of the questionnaire was carried out first to eliminate any areas of ambiguity and lack of clarity.

3.4.1.1 Pre-Test

The questionnaire was initially given to staff members of the Wits University Faculty of Information Systems for checking its validity and that the questions were understandable, were devoid of any ambiguity and all variables were included(face and content validity). The feedback and corrections were received and were then incorporated into the same questionnaire, prior to it being given to the pilot group.

3.4.1.2 Pilot

The questionnaire was piloted within the researcher's organization , the Passenger Rail Agency of South Africa(PRASA) to the executives of the different business units. Although the study is about the adoption of knowledge management systems by South African municipalities, the pilot was conducted at Passenger Rail Agency of South Africa(PRASA) which is the organisation where the researcher was employed during the time of the study. The choice of PRASA was informed by the fact that PRASA has a number of similarities between South African local government. Municipalities provide public transport, provide water & electricity, rent out buildings to businesses and individuals, among other services. PRASA provides public transport in a form of trains and buses, owns land and buildings which it rents out, buys water and electricity from municipalities and sells it to its tenants. The information and knowledge requirements of PRASA to be able to run and management its business mirrors that of municipalities. The choice of PRASA was also influenced by the fact that the researcher has worked for a number of business units and subsidiaries within PRASA and the researcher was acquainted to most senior managers in these business units. The latter reason then enabled the quicker turnaround time in terms of response feedback as the researcher has relationships with senior managers and executives within PRASA.

In this instance the questionnaire was administered through the e-mail system and timelines were given to the respondents to complete the questionnaire. This gave the researcher an opportunity to determine if all the questions were unambiguous and understandable to respondents. Subsequent to the administration of the pilot questionnaire, the researcher modified it, prior to sending it to the intended respondents. The pilot questionnaire was sent to an arbitrarily chosen number of ten respondents and only five responses were received. All questions in the pilot questionnaires had been answered. This response demonstrated that the questions were understandable and the language that was used was not confusing or incomprehensible. Therefore, no modification of the questionnaire was required.

3.5 Data Collection Methods

There are a number of ways that can be used to collect research data from respondents (Pinsonneault & Kraemer, 1993; Olivier,1993) . These include group administration of questionnaires, postal surveys, telephone surveys, face-to-face surveys, e-mail and the use of online questionnaires. The choice of a data collection method is crucial because it has the direct bearing on the quality and cost of the data collected (Pinsonneault & Kraemer, 1993).

In the case of this study, an online questionnaire was created from a system called **FreeOnlineSurveys**. The choice of this method was informed by a number of factors. These were;

- the fact that municipalities are scattered across the country, and it is not feasible to conduct face-to-face interviews
- Postal surveys will take too long and are cumbersome to administer
- Telephone surveys are expensive, considering the number of targeted respondents
- the privacy of the respondents needed to be protected.

An e-mail with a link to the on-line questionnaire, designed by the **FreeOnLineSurveys** system was sent to all municipalities. Prior to an e-mail being sent to the municipalities, respondents were called telephonically by the researcher as way of introducing himself and stating the purpose of the research. This exercise was meant to create a good relationship between respondents and the researcher and to increase the chances of the questionnaire being be completed and returned timeously.

3.6 Data Analysis Strategy

3.6.1 Descriptive Statistics

The data that was collected was analysed using the **IBM SPSS Statistics version 2.4**.

Section A of the questionnaire consists of the biographical information of the respondents. This includes the title of the respondent, the category of the municipality, the number of employees in the municipality, and the province where the municipality is located. The number of responses were summarised according to the titles of the respondents, the category of the

municipalities and the size of the municipality and the results were depicted by pie charts and bar graphs.

Section B of the questionnaire was about the adoption of the different knowledge management systems. This section had two subsections. The first sub section listed the different knowledge management system. The summary of responses that were tabulated indicated the number and percentage of municipalities which had each of the listed knowledge management systems.

The second subsection, which was the main dependent variable, had one question about the adoption of knowledge management systems by municipalities. Lickert scale with values from 1 to 5 was used in this instance. The summary of responses were tabulated and were illustrated graphically using a bar chart.

Descriptive statistics were also used to summarise the data gathered from independent variables. The following measures were used:

- Location or central tendency was measured by means of a mean, which denotes the most characteristic value around which other values are distributed. The average value from the Lickert scale for each variable was calculated.
- The spread or variation was measured by means of a range, variance and the standard deviation for each independent variable and was supplemented by a distribution curve for each variable with explanation of skewness and kurtosis.

The central tendency and the spread were calculated for the eight independent variables of "relative advantage" ," compatibility" , "complexity" , "cost" , "size", "top management support" ," maturity" and "stakeholder pressure" as well as the dependent variable " adoption of knowledge management systems by South African municipalities".

3.6.2 Inferential Statistics

The same technique was used to measure the reliability of the questionnaire and validity of the phenomenon being studied.

3.6.2.1 Reliability

Internal consistency reliability was used to enforce reliability since it is appropriate for a multi-variable construct (Maree, 2007). The Cronbach's alpha coefficient was used to determine the

relationship or closeness of the variables that are part of the same construct. The items where the value of the Cronbach's alpha were greater than 0,6 were accepted as these were closely related to one another, while the ones where the value was less than 0,6 were rejected as these were not related and did not seem to measure the same thing. By so doing the reliability of the measures were enforced.

3.6.2.2 Validity

The construct validity measures that were used were the item analysis and then the factor analysis. Item analysis indicates whether a factor is good or bad, in which case it needs to be retained or discarded, while factor analysis demonstrates the correlation between factors. Convergent validity demonstrates similarity between the different items of the same construct, while discriminant validity shows dissimilarity between these items.

Item analysis

Item analysis was conducted to identify items that needed to be removed or replaced. The inter-item correlations test was performed for each construct determine if the items were related to each other. The items that scored at least 0.3 were confirmed as related to each other and were retained as part of the same construct, while the ones that that scored less than 0.3 were dropped This was also a test conducted to determine convergent and discriminant validity of the items.

Factor analysis

Principal component analysis was used to group together the factors that measured the same dimension or factor. Factor loading was performed, and those items that loaded highly with each other were grouped together, and the ones that did not were separated. Those items where the value is greater than 0.4 formed part of the same factor, while the ones where the value was less than 0.4 were not part of the same factor. As part of the principal component analysis the techniques of Bartlett's test of sphericity and Kaiser-Meyer-Olkin(KMO) were used.

3.7 Hypothesis Testing

Correlation analysis and multiple regression analysis were used to test the relationship between independent variables within the technology, organization and environment contexts and the

dependent variable, the adoption of knowledge management systems by South African municipalities.

Correlation analysis was performed to determine the relationship among independent variables(Relative advantage, Compatibility, Complexity, Cost, Size, Top Management Support, Organizational Readiness, Knowledge about technology, Maturity, Information Intensity and Stakeholder Pressure), and between them and the dependent variable, the adoption of knowledge management systems by South African municipalities. The hypotheses was then confirmed where the significance levels were 0.01 and 0.05.

Multiple regression analysis was performed to measure the impact or significance of each of the independent variables to the dependent variables. The choice of " multiple" was informed by the fact that the research has many independent variables across the technology, organisation and environment factors. The outcome of the analysis then determined the impact of each of the independent variables to the dependent variable.

3.8 Ethical Consideration

The following ethical considerations were observed:

The researcher requested a clearance from the School's Ethics Committee, since human subjects were involved. Prior to the questionnaire being dispatched, the permission was obtained from the Ethics Committee and the same questionnaire was vetted by the researcher's supervisor. This approach has been supported by Maree (2007).

The researcher introduced himself properly and indicated the purpose of the study and research. This was done telephonically and it was included in the prologue of the questionnaire. Prior to the commencement of the interview the respondents were appraised of their rights.

Firstly, a permission of the respondent to participate in the survey was requested and the respondent was told that:

- They were being invited to participate in the study.
- The privacy of the respondents and the confidentiality of information would be respected (Burns, 2000).
- They had a right not to participate or to withdraw at any stage of the survey, should they so wish without any adverse effects to them (Maree, 2007; Burns, 2000).

- Confidentiality of organizational information would be observed (Burns, 2000).
- Data would be reported as told or received (Olivier, 2009; Maree, 2007; Burns, 2000).

Appendix B and **C** are attached as participation letter and clearance certificates respectively.

3.9 Conclusion

This chapter gave an outline of the research paradigm that was adopted, the sampling technique and the research methodology that was employed. This was followed by describing the research design, sampling, operationalization, data collection, data analysis and the ethical steps that were used . The next chapter describes the detailed tests that were conducted as well as the techniques used to analyse the data.

CHAPTER 4: DATA ANALYSIS

4.1 Introduction

This chapter analyses the data collected. At first, the data collection method, screening and cleaning procedures that were utilised are discussed. This is followed by the discussion of the sample demographics. Responses by municipal category, size and by the position of the respondents are analysed and depicted using graphs. The first section analyses the extent of adoption of knowledge management systems by local government. Analyses are done by the category and size of the municipality in terms of the number of employees. The adoption of the various categories of knowledge management systems is also analysed and the responses are illustrated graphically. The second section analyses the relationship between the adoption of knowledge management systems and a number of independent variables with the three contexts of the TOE model of organisation, technology and environment. Reliability and validity testing with factor analysis is then performed. The relationship between independent and dependent variables is also discussed. The hypotheses that were presented in chapter 2 are then tested using correlation analysis and regression analysis. The chapter concludes with a summary of hypotheses supported and not supported.

4.2 Sample Demographics

A survey was conducted across all 281 South African municipalities from 1 November 2016 to 15 February 2017. Prior to distributing the questionnaire, an attempt was made to call and establish a relationship with all respondents. Mixed results were obtained in that some respondents participated in the survey, while some, despite their earlier promises, did not participate. The survey took longer than planned because it was conducted during a busy 2016 Festive season and an equally busy 2017 period for finalising municipal budget.

4.3 Data Collection and Preparation

The data was collected using an online tool known as Free Online Surveys. It was then exported to Microsoft Excel, prior to being exported to SPSS (version 24.0.0) for analysis. A total of 93 responses were received after 14 weeks of data collection. Given that there were 281 potential respondents, a response rate of 33.1% was obtained. The response rate obtained from this study is deemed to be slightly lower than the norm and has been considered as a limitation to the study. The 93 responses, nevertheless, have provided sufficient data to allow for statistical tests of the hypotheses.

4.3.1 Data Cleaning - Missing values

Some cases with missing values can be observed once the data has been collected. Depending on the scale and number of the missing values, the results can be distorted. Out of the 93 responses that were obtained, only three had missing values across some variables. The mean substitution imputation method was thus used, in order to replace missing values with the mean so as to retain the size of the sample.

4.3.2 Data Cleaning - Outlier detection and removal

No extreme values were detected and thus no outliers were removed. All 93 usable responses were kept for further analysis, despite some fields being blank.

4.4 Categories and location of municipalities

The response rate from the different categories of municipalities was as follows.

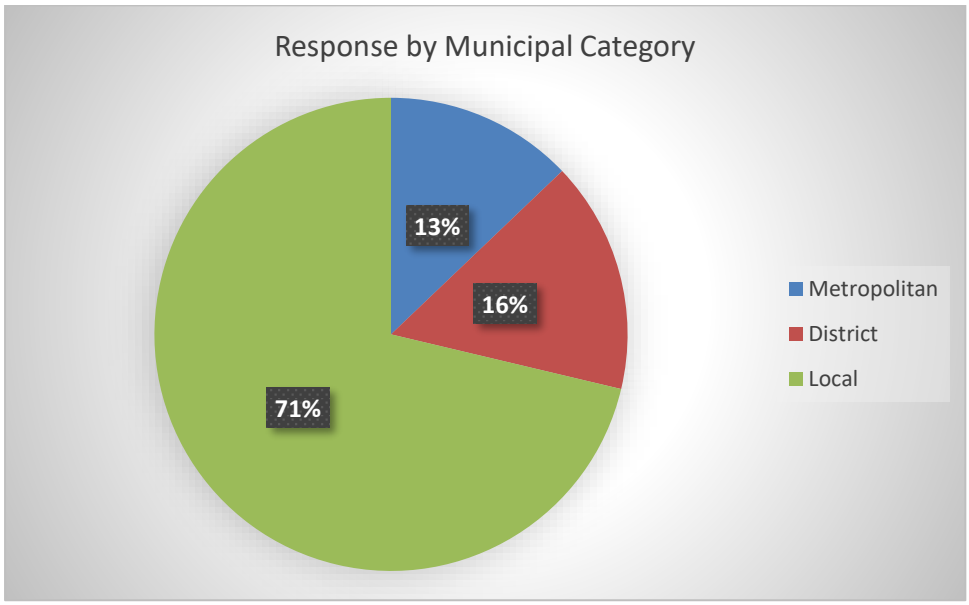


Figure 3 : Response rate by municipal category

South Africa has 257 municipalities. Of these 3% are metropolitan, 17% are district municipalities and 80% are local municipalities. The response rates that are displayed in Figure 3 above of district and local municipalities somewhat matches their composition, in percentage terms, since the highest number and percentage is from local municipalities which are also the majority. Metropolitan municipalities have a response rate of 13%, while they make 3% of South African municipalities. The plausible explanation of this response is that in some

metropolitan municipalities more than one person may have responded. It can also be assumed that the good response rate is attributable to the fact that the metropolitan municipalities, because of their size, have established knowledge management departments and sections.

4.5 Position of respondents

The profile of respondents was as follows

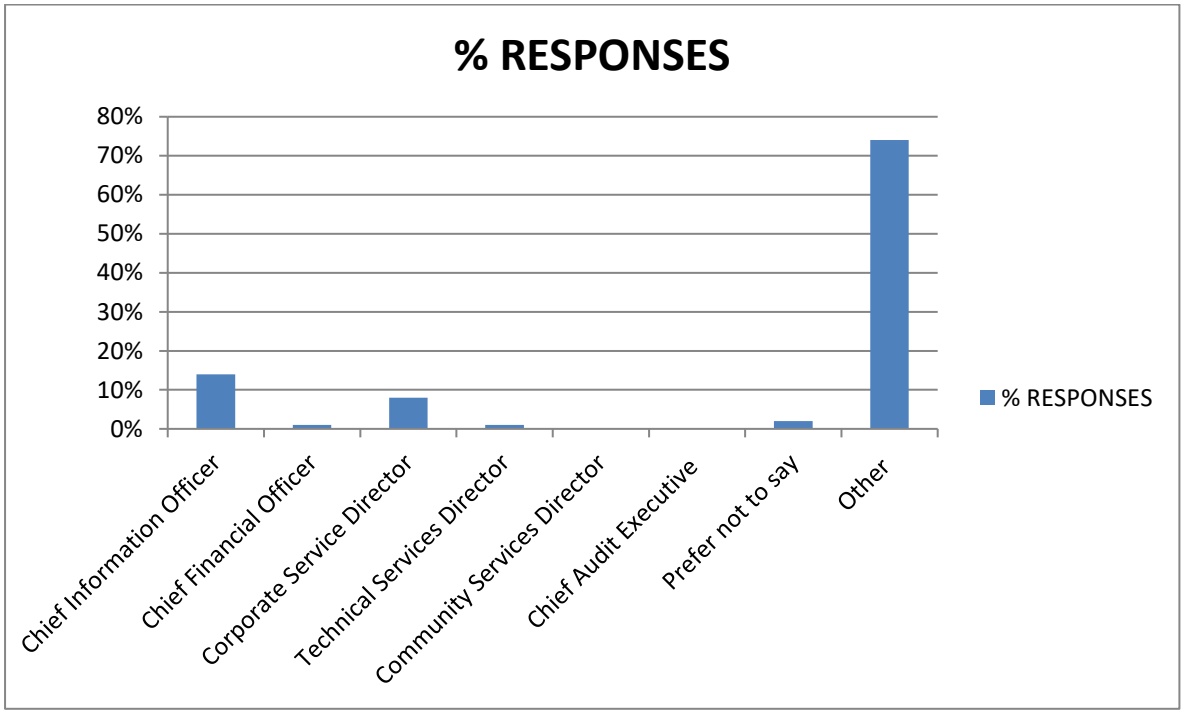


Figure 4 : Response by position of respondents

The frequency diagram displays position of respondents is negatively skewed towards the ‘’Other”. Different municipalities have different structures when it came to information technology. In some municipalities the ICT department reported to the Chief Financial Officer, in some it reported to the Corporate Services Manager and a few had a Chief Information Officer as head of department. Some municipalities had ICT completely outsourced to external companies. Some Chief Financial Officers and Corporate Services Directors admitted that although ICT reported to them, they did not have full information about knowledge management systems and its adoption across their municipalities, hence they delegated the completion of the questionnaires to managers or senior IT officers in their departments. These included IT Managers, IT Infrastructure managers, Systems Managers and in limited cases

Knowledge managers. This then explain why most responses were from the "**other**" category, as opposed to the targeted heads of departments. Some municipalities have specific departments, outside of ICT, which were the custodians of knowledge management. The responding to the questionnaire was then delegated to them.

4.6 Adoption of Knowledge Management Systems by municipalities

4.6.1 Adoption of different types of KMS by municipalities

Section B of the questionnaire had six questions on the use of each category of the knowledge management system by the municipality concerned. The categories of the knowledge management systems were the Intranet, Electronic Document Management System, Content Management System, Geographic Management System and the Business Intelligence System. The responses were as follows

KMS	No of Respondents	Percentage(%)
Intranet		
Have	58	63
Does not have	34	37
Total	**92**	**100**
Document Management System		
Have	61	66
Does not have	31	33
Total	**92**	**100**
Content Management System		
Have	49	54
Does not have	42	46
Total	**91**	**100**
Geographic Management System		
Have	82	90
Does not have	9	10
Total	**91**	**100**
Business Intelligence System		
Have	25	28
Does not have	64	72
Total	**89**	**100**
Any other KMS		
Have	16	17
Does not have	77	83

Total	**93**	**100**

Table 3: Response rate by type of KMS

63% of municipalities have adopted an intranet while 37% do not have any intranet at all. 66% reported having adopted some form of a document management system, while 34% do not use utilise any. 54% have adopted some form of a content management system, while 46% do not have any. Geographic Information System was reportedly adopted by 90% of all municipalities. 27% had adopted some of a business intelligence system, while 73% did not have any. Lastly 17% of the municipalities indicated that they have other forms of knowledge management systems that were not among the listed types.

4.6.2 Adoption of different types of KMS by individual departments within municipalities

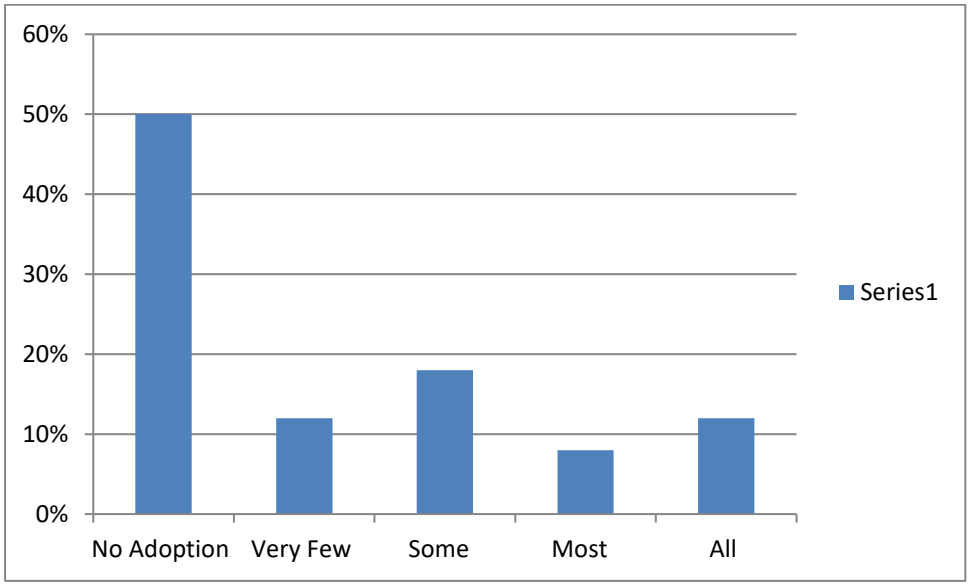


Figure 5: Adoption by number of departments

50% of municipalities reported that none of its department has adopted any knowledge management system(KMS),12% have adopted or two,18% have some adopted KMS, 8% have most of their departments adopted some form of KMS, and 12% responded by indicated that all of their departments have adopted some form of KMS. The adoption of knowledge management systems frequency distribution displays positive skewness, which is on the side of **No Adoption**.

Local municipalities account for 72% of responses, and 80% of the composition of all South African municipalities. As compared to both metropolitan and district municipalities, most local municipalities are poor and are technologically and financially underresourced. The 50% non-adoption of knowledge management systems could be explained by the fact that most municipalities do not have the requisite financial resources to adopt knowledge management systems.

4.6.3 Adoption of Knowledge Management Systems by Municipality Size

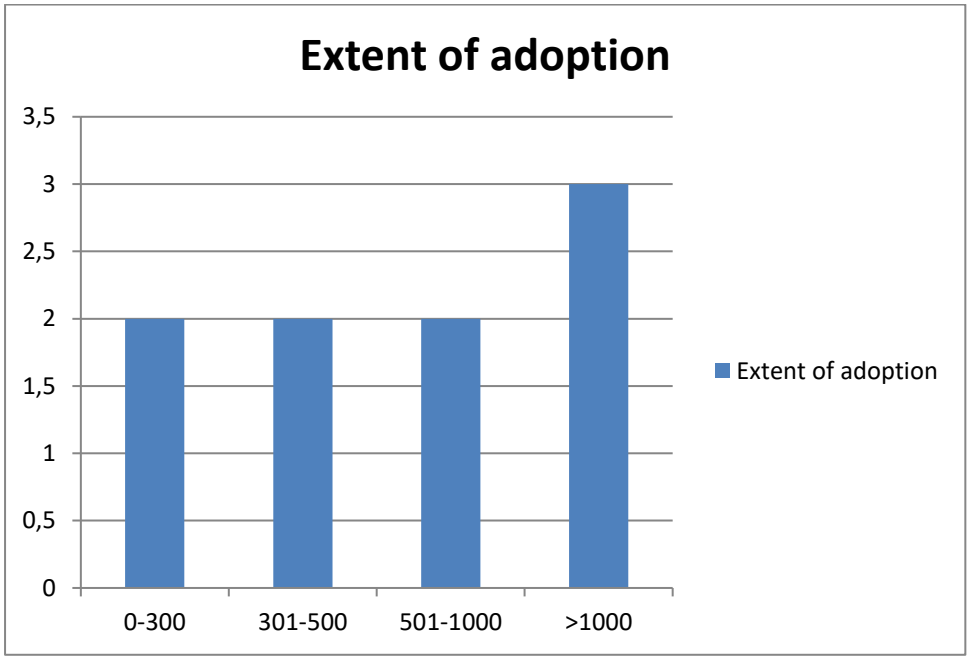


Figure 6 : Adoption by municipal size

In municipalities where the number of employees were less than 1000, the adoption of knowledge management systems was limited to one or two departments. In those municipalities with more than 1000 employees, a number of departments had adopted a knowledge management system. The diagram displays a slight positive skewness.

4.6.3 Adoption of Knowledge Management Systems by Municipality Category

Note: A Lickert scale of 1-5 was used to denote the extent of adoption as explained in the questionnaire, Appendix A.

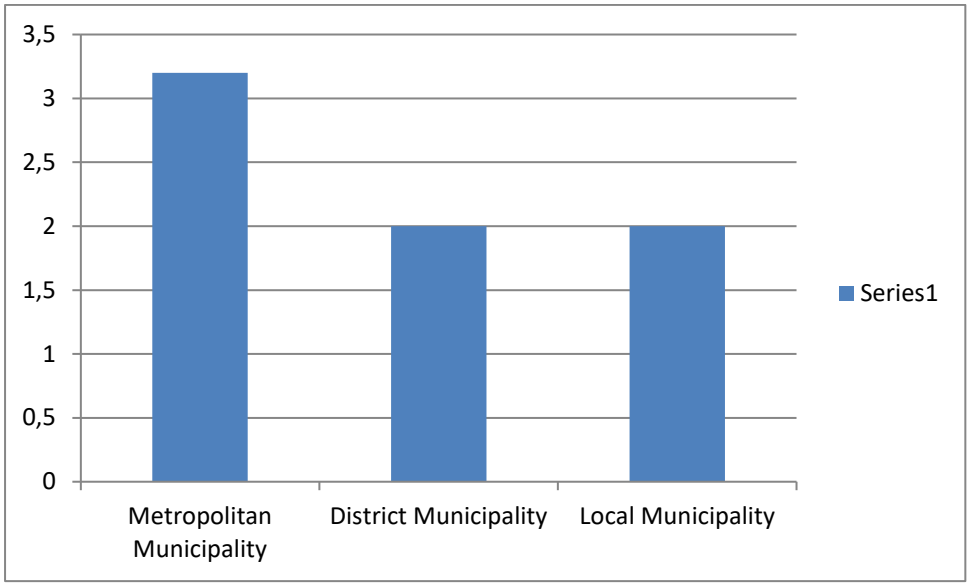


Figure 7: **Adoption by municipal category**

The analysis by municipality category revealed that within local and district municipalities, the adoption of knowledge management systems was limited to one or two departments, whereas in metropolitan municipalities a number of departments, although not all, have adopted knowledge management systems.

Metropolitan municipalities are the biggest municipalities in South Africa. These are Ethekwini, City of Johannesburg, Tshwane, Ekurhuleni, City of Cape Town, Mangaung and Nelson Mandela municipalities. These municipalities have huge budgets and have employees which are more than 1000. However, South Africa has only 9 Metropolitan municipalities.

On the other hand, the country has a higher number of district and local municipalities, each of which has smaller budgets and number of employees in relation to metropolitans.

From the municipal category and the number of employees results above, it can be seen that the biggest municipal category, and which happens to have the highest number of employees, has a higher adoption rate of 3, in relation to the rate of 2 for the other municipal categories. Does it mean that the bigger the municipality, the higher the knowledge management system

rate or does it mean the bigger the budget the higher the adoption rate? Section B will then attempt to answer this question, while considering other independent variables as well.

Section B consisted of questions about the independent variable, as well as the three independent variables of technology, organisational and environmental contexts. Since the independent variable has been discussed above, the discussion will be on the responses on the three contexts.

4.7 Factors that influence the adoption of Knowledge Management Systems

The reliability and validity of the measurement scales were tested prior to proving or disproving the research model.

4.7.1 Principal Component Analysis

PCA can also prove discriminant validity by illustrating that items do not load across different components.

To determine the factorability of the data, Bartlett's test of sphericity, and Kaiser-Meyer-Olkin measure of sampling adequacy tests were conducted. For factorability the KMO must have a minimum value of 0.6, while the Bartlet's test must be significant at $p < 0.05$. In this case the KMO was 0.733 and Bartlet's was significant at $p < 0.001$.

A rotated Varimax solution with Kaizer Normalization was conducted. Items that had a loading greater than 0.5 were considered acceptable, while the ones with loadings less than 0.4 were eliminated.

Seven components, each with eigenvalue greater than one, were extracted. These components explained the majority of the variance(79.5%). Table 8 below shows the results of the KMO and Bartlett's Test.

1. **KMO and Bartlett's Test**

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.733
Bartlett's Test of Sphericity	Approx. Chi-Square	1737.806
	Df	378
	Sig.	.000

Table 4: KMO and Bartlett's Test

4. 8 Initial Validity and Reliability

Nine composite scores were created, eight for independent variables, one each for "Relative advantage", "Compatibility", "Complexity", "Cost", "Size", "Top Management Support", "Maturity" and " Stakeholder pressure" for and one for the dependent variable , " the adoption of knowledge management systems by South African municipalities".

Variable	N	Min	Max	Mean	Std. Deviation	Variance	Skewness Statistic	Skewness Std Deviation	Kurtosis Statistic	Kurtosis Std.Deviation
Relative Advantage	90	1	5	4.34	0.849	0.549	-2.194	0.255	7.674	0.506
Compatibility	90	1	5	3.54	0.91	0.819	-0.017	0.255	-0.443	0.506
Complexity	90	1	5	2.66	0.74	0.544	-0.043	0.257	0.579	0.508
Cost	90	1	5	2.7	0.89	0.800	0.149	0.254	0.364	0.503
Size	90	1	4	2.57	1.21	1.475	-0.135	0.255	-1.553	0.506
Top Management Support	90	1	5	3.15	0.96	0.924	-0.445	0.255	-0.298	0.506
Maturity	90	1	5	2.99	0.93	0.863	-0.210	0.257	-0.495	0.508
Stakeholder Pressure	90	1	5	3.02	0.78	0.602	-0.326	0.255	1.061	-.506
Adoption of KMS	90	1	5	2.24	1.45	2.09	0.769	0.258	-0.803	0.511

Table 5: Composite Scores for all variables

Table 9 displays the descriptive statistics for all the composite scores. The " relative advantage" showed the highest the highest mean score (mean = 4.34 , sd=0.849) , whereas the complexity had the lowest mean (mean=2.66 , sd=0.74). Standard deviation scores ranged from the lowest for " Stakeholder pressure" with 0.78 to the highest for "Size" with 1.21.

The values for the skewness were between -1 to +1 range, with the exception of "Relative advantage" which was less than -2. The values for the kurtosis were also between -1 and +1 range for all variables, except the " Relative advantage" which was 7.6.

These composites were then tested for validity and reliability.

The validities and reliabilities for each variable are shown below.

	Stakeholder Pressure	Maturity	Relative Advantage	Top Management Support	Complexity	Compatibility
RelAdv3			.781			
RelAdv4			.795			
Compt1						.752
Compt2						.778
Compt3						.789
Compx1					.881	
Compx2					.818	
Compx3					.730	
Compx4						
Compx5						
TMS1				.821		
TMS2				.799		
TMS3				.800		
MAT1		.846				
MAT2		.826				
MAT3		.798				
MAT4		.786				
RelAdv17			.772			
RelAdv18			.890			
SHP1	.896					
SHP2	.897					
SHP3	.822					
SHP4	.754					
Cronbach Alpha	0.895	0.902	0.938	0.847	0.746	0.822
AVE	0.71	0.66	0.66	0.65	0.66	0.6
SQRT of AVE	0.84	0.81	0.81	0.81	0.81	0.77

Table 6: Principal Component Analysis

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.[a]

a. Rotation converged in 6 iterations.
b. Three items in the Relative Advantage (RelAdvA1,RelAdv2,RelAdv5) construct were deleted.
c. One item (Compt6) in the Compatibility construct was deleted.
d. One item(Compx12) in the Complexity construct was deleted
e. Organisational Readiness and Knowledge about Systems Technology construct were removed because of low Cronbach Alpha. Mat15 and InfoTens16 were also removed

Scale Reliability

Construct	Number of Items	Cronbach Alpha	Comments	
Relative Advantage	5	0.938	The scale is reliable	
Compatibility	4	0.822		
Complexity	6	0.746	T12 was dropped to have the Alpha of 0.746 from 0.575	
Cost	1	Not Applicable		
Size	1	Not Applicable		
Top Management Support	3	0.847	The scale is reliable	
Organizational Readiness	4	0.425	Scale not reliable. The entire construct was dropped.	
Knowledge about technology & Systems	3	0.462	Scale not reliable. The entire construct was dropped.	
Maturity	5	0.902	015 was dropped to have the Alpha of 0.902 from 0.671	
Information Intensity	3	0.814	016 was dropped to have the Alpha of 0.814 from 0.717	
Stakeholder Pressure	4	0895	The scale is reliable	

Table 7: Scale reliability

The constructs Organizational Readiness and Knowledge about Technology & Systems were dropped due to Cronbach Alphas that were very low, implying the unreliability of the scale.

4.9 Revised Model

The *knowledge about KM Systems and Technology*, as well as the *Organisational Readiness* variables in the organisational factors context have been dropped, due to their Cronbach Alphas being 0.462 and 0.425 respectively, which were far below the required 0.7. The other reason for the dropping of these variables is that the items within them failed the unidimensionality and convergent validity tests.

Consequently, the following hypotheses have been dropped

Hypothesis 8: *Knowledge about Systems and Technology will have a positive impact on municipalities' intention to adopt KM systems.*

Hypothesis 7**:** *Organizational Readiness will have a positive impact on KMS adoption by municipalities.*

Hypothesis 10**:** *Information Intensity will have a positive impact on KMS adoption by municipalities.* The information Intensity has been merged with the Relative Advantage variable. This is because the items that originally belonged to this factor loaded into the Relative Advantage factor.

The research model has been revised to reflect the changes mentioned above.

Revised Model

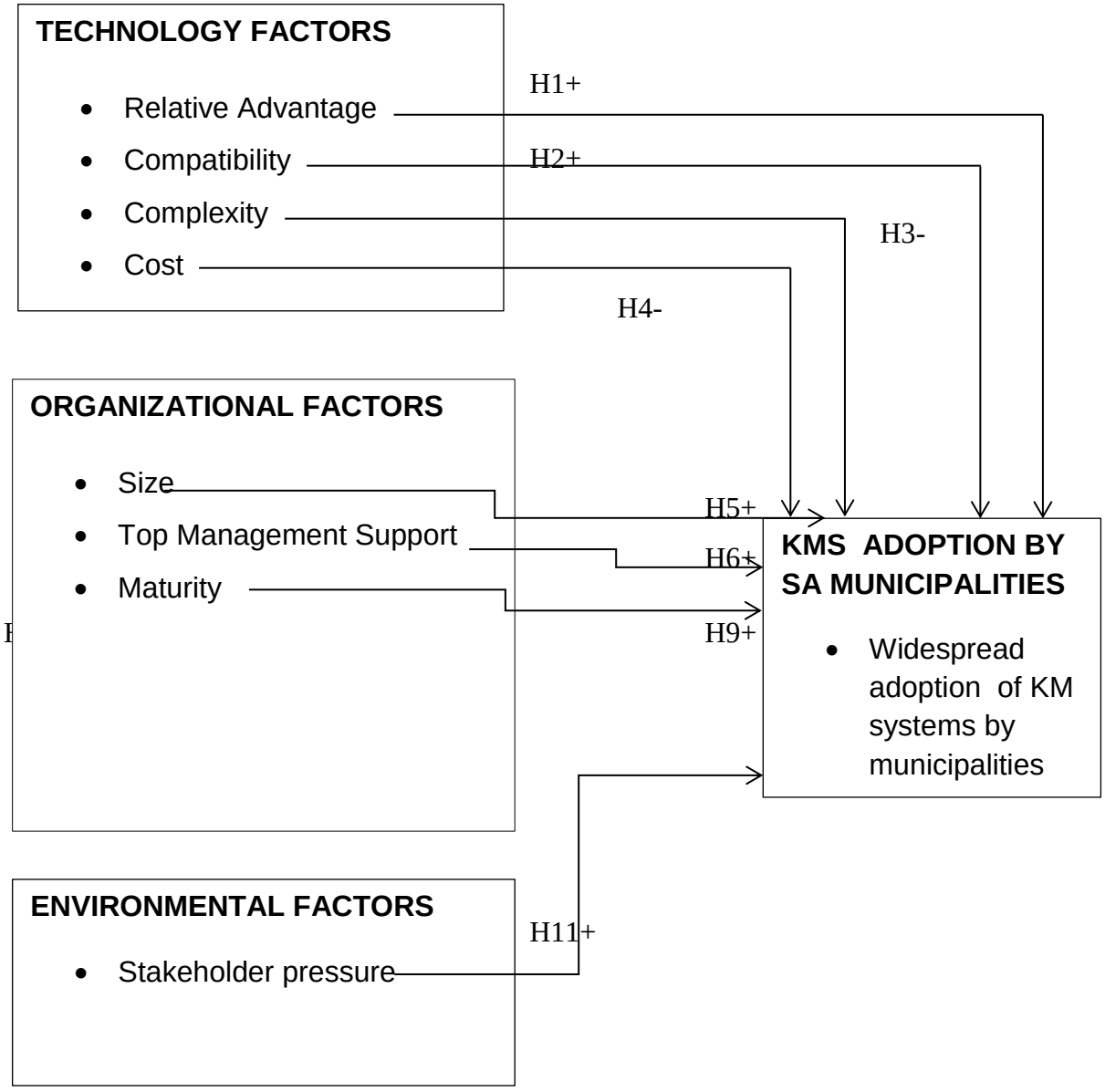


Figure 8: Revised research model

4.10 HYPOTHESIS TESTING

4.10.1 Correlation Analysis

Composite scores were calculated for Relative Advantage, Compatibility, Complexity, Cost, Size, Top Management Support, Maturity and Stakeholder Pressure. These were average of the items that formed the variables. The descriptive statistics of these variables are indicated below.

Correlation analysis was performed between the remaining composite variables and the dependent variable of the extent of the adoption dependent variable of knowledge management systems adoption. The results are as follows:

	Adoption of KM	**Size**	**Relative Advantage**	**Complexity**	**Compatibility**	**Cost**	**Top Mgmt Support**	**Maturity**	**Stakeholder Pressure**
Adoption of KM	1	**0.303****	0.191	**-0.304****	**0.259***	-0.114	0.008	-0.025	0.046
Size	**0.303****	1	0.075	-0.179	0.134	-0.192	-0.06	-0.014	0.078
Relative Advantage	0.191	0.075	1	-0.050	0.551	0.102	0.198	0.163	0.362
Complexity	**-0.304****	-0.179	0.050	1	-0.245	0.141	-0.149	-0.029	0.068
Compatibility	0.**259***	0.134	0.551	-0.245	1	0.126	0.384	0.378	0.248
Cost	-0.114	-0.192	0.102	0.141	0.126	1	0.170	0.131	0.152
Top Mgmt Support	0.008	-0.06	0.198	-0.149	0.384	0.170	1	0.434	0.191
Maturity	-0.025	-0.014	0.163	-0.029	0.378	0.131	0.434	1	0.249
Stakeholder Pressure	0.046	-0.078	0.362	0.068	0.248	0.152	0.191	0.249	1

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

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

Table 8: Correlation analysis- Independent variables and the dependent variable

Table 13 depicts s the correlation between the dependent variable, the adoption of knowledge management systems and only three dependent variables which are the size, complexity, relative advantage and compatibility. However, the correlations for the size, complexity and compatibility are significant at 0.01 , 0.01 and 0.05 respectively.

Hypothesis H1+(Relative Advantage)

The relationship between **Relative advantage**(M=4.24 ,SD=0.849) and **the extent of adoption of the knowledge management system**(M=2.24,SD=1.45) was examined. The

correlation coefficient between these variables yielded a sample correlation coefficient of 0.191, which is statistically insignificant (r = 0,191 ;p >0.01). The hypothesis between Relative Advantage and the extent of the adoption of knowledge management systems is therefore rejected.

Hypothesis H2+(Compatibility)

Pearson correlation analysis was used to examine the relationship between ***Compatibility***(M=3.54 ,SD=0.91) and the ***Extent of adoption of the knowledge management system*** (M=2.24, SD=1.45). For an & level of 0.05, the correlation coefficient between these variables yielded a sample correlation coefficient of 0.259, which is statistically significant (r = 0,259; p < 0.05). The hypothesis between compatibility and the extent of the adoption of knowledge management systems is therefore accepted.

Hypothesis H3-(Complexity)

Pearson correlation analysis was used to examine the relationship between ***Complexity***(M=2.66,SD=0.74) and the ***Extent of adoption of the knowledge management system*** (M=2.24, SD=1.45). For an & level of 0.05, the correlation coefficient between these variables yielded a sample correlation coefficient of -0.304, which is statistically significant(r = -034; p < 0.05).The hypothesis between compatibility and the extent of the adoption of knowledge management systems is therefore accepted.

Hypothesis H4-(Cost)

Pearson correlation analysis was used to examine the relationship between *Cost* (M=2.7,SD= 0.89) and the *Extent of adoption of the knowledge management system*(M=2.24,SD=1.45) was examined. For an & level of 0.05 the correlation coefficient between these variables yielded a sample correlation coefficient of -0.093, which is statistically insignificant(r = -0.093; p < 0.05). The hypothesis between Relative Advantage and the extent of the adoption of knowledge management systems is therefore rejected.

Hypothesis H5+(Size)

Pearson correlation analysis was used to examine the relationship between *Size* and the *Extent of adoption of the knowledge management system* was examined. The two independent

variables of size, which are the **Category of the municipality** (A2) and the **Number of employees**(A3).

The correlation coefficient between the **Category of the municipality** and the **Extent of adoption of the knowledge management system** was **-.0293** which is significant at the 0.01 level. The negative sign is due to the fact that the category of the municipality in the question was phrased in a descending order from the largest category(metropolitan municipality) to a smallest category(local municipality).

The correlation coefficient between the **Number of employees**(M= 2.57, SD= 1.214) and the **Extent of adoption of the knowledge management system**(M=2.24, SD=1.45)was 0.304 which is significant ($r = -.304$, $p < 0.01$). The hypothesis between size and the extent of the adoption of knowledge management systems is therefore supported.

Hypothesis H6+ (Top Management Support)

Pearson correlation analysis was used to examine the relationship between *Top Management Support* (M=3.15,SD=0.96) and the *Extent of adoption of the knowledge management system*(M=2.24 , SD=1.45) was examined. The correlation coefficient between these variables yielded a sample correlation coefficient of 0.008, which is statistically insignificant ($r = 0,008$; $p < 0.05$).The hypothesis between Relative Advantage and the extent of the adoption of knowledge management systems is therefore rejected.

Hypothesis H7+ (Maturity)

Pearson correlation analysis was used to examine the relationship between Maturity (M=2.99 ,SD=0.99) and the *Extent of adoption of the knowledge management system*(M=2.24,SD=1.45) was examined. The correlation coefficient between these variables yielded a sample correlation coefficient of -0.025, which is statistically insignificant since in this case ($r = -0.025$; $p > 0.05$). The hypothesis between Maturity and the extent of the adoption of knowledge management systems is therefore rejected.

Hypothesis H8+ (Stakeholder Pressure)

Pearson correlation analysis was used to examine the relationship between Stakeholder Pressure (M=3.017 ,SD=0.78) and the *Extent of adoption of the knowledge management system*(M=2.24,SD=1.45) was examined. The correlation coefficient between these variables

yielded a sample correlation coefficient of 0.046, which is statistically insignificant ($r = 0.046$; $p < 0.005$). The positive causality hypothesis between Relative Advantage and the extent of the adoption of knowledge management systems is therefore rejected.

4.11 REGRESSION ANALYSIS

Following the acceptance and rejection of some variables, a multiple regression analysis was performed based using the variables which were significantly correlated to the independent variable.

4.11.1 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.413[a]	.170	.127	1.338

a. Predictors: (Constant), CompRelAdv, CompComplexity, A3, CompCompatibility

Table 9: Model Summary

The R Square is 17.0, suggesting that the model explains roughly 17% of the variance of the adoption of the knowledge management systems. This is significant at the $p < 0.005$ level.

4.11.2 ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	28.286	4	7.072	3.951	.006[b]
	Residual	137.811	77	1.790		
	Total	166.098	81			

a. Dependent Variable: B7

b. Predictors: (Constant), CompRelAdv, CompComplexity, A3, CompCompatibility

Table 11: ANOVA

4.11.3 Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	T	Sig.
1	(Constant)	1.375	1.186		1.160	.250
	Size	.321	.126	.268	2.541	.013
	Compatibility	.197	.196	.123	1.005	.318
	Complexity	-.395	.205	-.209	-1.923	.058
	Relative Advantage	.087	.228	.046	.381	.704
				R Square =	0.17	

a. Dependent Variable: B7

Table 10: Coefficients – Regression Analysis

Table 10 shows the results of the regression analysis. The independent variable that has the largest significant effect on the adoption of knowledge management systems is A3, which denotes the size of the municipality, since it has 0.268. This is followed by the complexity at -0.209, and the compatibility at 0.123.

The results of the correlation analysis and the multiple regression that confirm some hypotheses and reject some. In the Technological Context, the Complexity and Compatibility were accepted. In the Organizational factors, only the Size variable is accepted. The only variable in the Environmental factors, the Stakeholder Pressure is rejected. This is demonstrated below. The diagrams in **Appendix E** show the results of Assumption of Linear Relationships, Heteroscedasticity/Homoscedasticity and Normality of the residual distribution . The tests were done using the dependent variable " KMS Adoption" , against the four independent variables of "Size", "Complexity", "Compatibility" and "Relative Advantage".

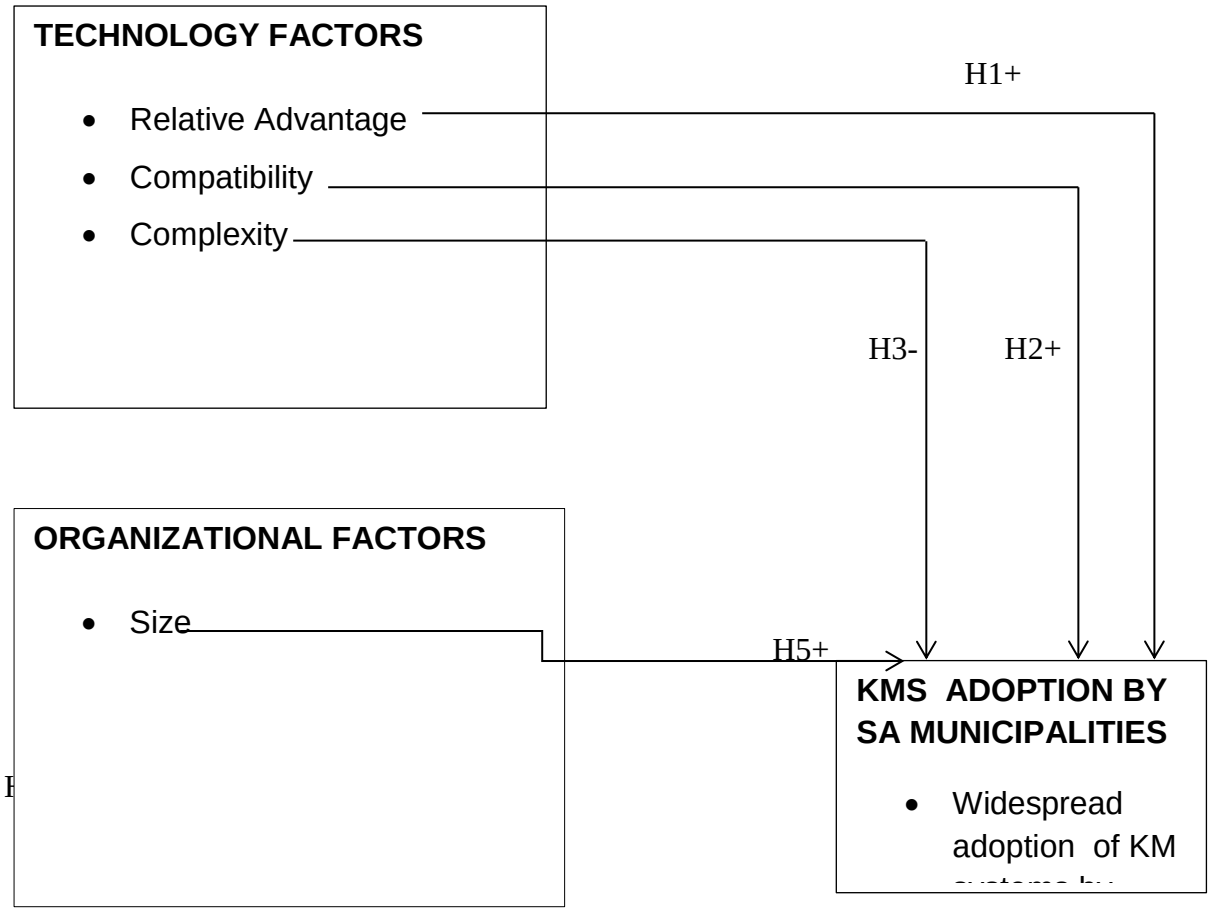


Figure 9: Supported hypotheses

4.12 CONCLUSION

This chapter presented and discussed results of data analysis.

The first objective, which was to determine the extent of the adoption of knowledge management systems was achieved. The result demonstrated that the rate of adoption of these systems is significant among the municipalities that were surveyed.

The first objective was to test the eleven hypotheses using the TOE theory. In this instance two of the eleven hypotheses that were proposed were fully supported. These were the effects "complexity" and " size" on the adoption of knowledge management systems by South African municipalities. These predictors explained 17% of the variance towards the adoption of the knowledge management systems by South African municipalities.

The next chapter will discuss and interpret key findings. Limitations of the present study will be highlighted and suggestions for future research will be presented.

CHAPTER 5: DISCUSSION

5.1 Introduction

This chapter discusses and analyzes the results of the study in the light of the latest literature as well as the literature that was discussed in Chapter 2. The first part of the chapter discusses the extent of adoption of knowledge management systems by municipalities. The discussion is based on the adoption of the knowledge management systems in general, and also on the adoption of specific types of knowledge management systems. The second part of the chapter is categorised into supported, partially supported and unsupported hypotheses. The results of the study are then contrasted against the initial hypotheses. The chapter closes by citing the literature that support such results.

5.2 Adoption of Knowledge Management Systems by South African Municipalities

The first objective of the study was to determine the extent to which South African municipalities have adopted knowledge management systems. The results revealed that half the number of municipalities have adopted knowledge management systems. However, the second part of the first objective prompted respondents to indicate the knowledge management systems that their organisations have adopted. The results from these questions revealed that a more than 50% of municipalities that responded have adopted at least one knowledge management system.

The discrepancy between the results of the two questions of the same variable can be explained by the fact that a majority of respondents were neither IT managers nor Knowledge management professionals, but were in the "Other" category. This may mean that some of the respondents, who were delegated by their principals to respond to the questionnaire, may not have had full understanding of knowledge management systems, while they may have seen categories of individual knowledge management systems within their organisations. The higher adoption response shown in the detailed question, by KMS type, may be supported by the fact some of their knowledge management systems, like a GIS is strategic and crucial for any municipality since it enables the core business processes of the municipality. This view is supported by Olsen et al (2001) where they mention that GIS attract keen interest from information systems managers whether they have one in place or not. They mention that since so much of the city's work is concerned with geography-related issues, cities have a compelling

interest in developing and maintaining a GIS. In the context of a municipality one is tempted to contend that a GIS system is as important as accounting/payroll/communication systems are to all organisations.

The adoption of the other types of knowledge management systems like the intranet and the Document Management Systems was also high. The high adoption of the intranet may be informed by the fact that a high degree of municipal information and knowledge reside within them. Examples of this information includes notices, policies, departmental plans and reports. The high adoption of the document management system may be informed by the fact that all municipalities have Registry and Documents sections, where large volumes of records and documents are generated and kept.

The discussion of each independent variable will be based on its relationship with the adoption of knowledge management systems dependent variable.

5.3 Discussion of enablers and inhibitors of knowledge management adoption

The results of the analysis showed that in the context of municipalities the TOE model was supported by the size and complexity independent variables from the organizational and technology contexts respectively. The table below summarises the results of the research/analysis.

Hypothesis	**Status**
1.The **size** of the organization will have a positive impact on municipalities 'intention to adopt KM systems	Supported
2.The **complexity** of KM systems will have a negative impact on municipalities' intention to adopt KM systems	Supported
3..**Relative advantage** of KM systems will have a positive impact on municipalities' intention to adopt KM systems	Partially supported
4.The **compatibility** of KM systems will have a positive impact on municipalities' intention to adopt KM systems	Partially supported
4.The **cost** of KM systems will have a negative impact on municipalities' intention to adopt KM systems	Not supported
5.The **top management support** will have a positive impact on municipalities 'intention to adopt KM systems	Not supported
7.The **maturity** of the organization will have a positive impact on municipalities 'intention to adopt KM systems	Not supported

8.**Stakeholder pressure** will have a positive impact on municipalities 'intention to adopt KM systems	Not supported

Table 12: Summary of supported, partially supported and unsupported hypotheses

5.3.1 Supported Hypotheses

The hypotheses about the impact of size of the municipality and the complexity of the knowledge management systems were fully supported.

5.3.1.1 Size

It was hypothesized that size has a positive correlation with the adoption of knowledge management systems by South African municipalities.

The results show that this hypothesis was supported. The fact that the adoption of the knowledge management systems by South African municipalities is positively related to the **size** of the municipality can be explained by the fact that South African biggest municipalities have a larger pool of resources (Venter et al,2007). These resources include large budgets, more developed ICT systems and structures, and higher levels of maturity in terms of ICT governance and the adoption of knowledge management.

Municipalities where the number of employees is less than a thousand, indicated that one or two departments have adopted at least one knowledge managements system, while the ones with employee numbers more than a thousand, have more than two departments that have adopted some form of knowledge management system. These results were also supported by the outcome of the analysis by municipality category. Metropolitan municipalities showed that more than two departments have adopted some form of knowledge management system, while district and local municipalities indicated that at least one or two departments have adopted some form of knowledge management system. The positive effect of size has wide support from the literature. Medium and large organizations adopt ICT with the highest intensity (Cudanov et al, 2010). According to Arduini et al (2008), the larger the municipality the more these will attract qualified personnel and financial resources. Attour (2000) states that municipalities that are larger and have more financial resources are likely to adopt technology and innovation more rapidly than smaller municipalities with limited resources.

The responses about the extent of the adoption of knowledge management systems indicate that only half of South African municipalities have adopted some form of this technology. Nonetheless, the results by municipal category and size indicate that the majority of municipalities have adopted one form of knowledge management system. The latter results are also supported by the responses from the adoption of a category of knowledge management system.

5.3.1.2 Complexity

It was hypothesized that the complexity of the knowledge management system has a negative relationship to the adoption of knowledge management systems by South African municipalities.

The results of the analysis also supported the fact that the complexity of the system has an inverse relationship with the adoption of knowledge management systems. The GIS, Intranet, Document Management System and Content Management Systems exhibited high adoption rates across the municipalities that were surveyed. These systems may be easier to use than other systems in functional areas like Accounting, Human Resources and Town Planning which require specialised functional knowledge and training. The higher adoption rates of the mentioned categories of knowledge management systems may therefore be attributed to their ease of use.

Unlike the other types of knowledge management systems, Business Intelligence Systems and Content Management Systems exhibited lower adoption rates. The lower adoption rate may be ascribed to the fact that Business Intelligence Systems are specialised and are intended for use by executive managers of organizations who may need to extract data from a number of systems to have an overall view of the organization. The content management system is also a specialised system within organisations which is used by employees with a higher level of education. The study by Evangelita et al (2010) revealed that among small companies in Italy, company website and workgroups were the most widely used forms of knowledge management systems because of their ease of use and simplicity. They demonstrated that advanced knowledge systems like document management system, data mining and decision support systems were rarely used.

5.3.2 Partially Supported Hypotheses

The hypotheses about the impact of relative advantage of the knowledge management systems to the municipality and their compatibility to other systems were partially supported.

5.3.2.1 Relative Advantage

In this context, it was hypothesized that the relative advantage of knowledge management systems contributes to their higher adoption by South African municipalities. The context was that the propensity to adopt knowledge management systems will be higher in comparison to remaining with old and manual ways of managing knowledge.

The results of the study indicated that there is a positive correlation between relative advantage and the adoption of knowledge management system. However, the impact was not significant. Because of the low significance level, the hypothesis was partially supported.

The positive impact of the relative advantage as a contributor to adoption of the knowledge management systems by organisations enjoys some support in the academic literature. Ozlen (2013) argued that the rate of adoption of knowledge management systems is positively influenced by the advantages and benefits that this system gives to users. He demonstrated this by indicating that there was a high adoption of knowledge management systems by employees of the Turkish municipalities, because the system enabled the knowledge management function, which in turn helped them to provide better service to the community. Evangelita et al (2010) demonstrated that the adoption of knowledge management systems by small firms in Italy gave these companies additional advantages. These advantages were increased operational management, improved innovation, an ability to identify market opportunities, competitive environment knowledge and the ability to benchmark competitors. A number of organisations have also benefited from the successful implementation of a category of knowledge management system, known as knowledge –based systems (Avram, 2010). According to Avram (2010) the use of these systems has benefit in professional areas such as medicine, pharmaceutics, environmental management, robotics, law enforcement, financial services, manufacturing and many other fields. The examples above thus support the assertion that relative advantage or the benefit of a knowledge management system does contribute to its higher adoption.

5.3.2.2 Compatibility

This means that within municipalities, the manner in which the GIS, intranet, business intelligence systems, document management systems are integrated with other systems and the existing hardware defines the compatibility and therefore the ease and speed with which these knowledge management systems will be adopted. In addition to this, the way in which these systems automate the existing business processes determines the extent of adoption of the knowledge management systems. For example, a municipality must continuously monitor the trends in the payment of services, by area, by community. It must also have an up-to-date information on the maintenance of its various infrastructure and facilities for planning purposes. This information is stored in operational in-house systems within them. In the context of any municipality, any system that can provide knowledge about the state of municipal infrastructure, and help with the municipal, spatial and infrastructure planning, must enjoy high levels of adoption, since it is compatible with the core business activity and mandate of the municipality.

This hypothesis was partially supported by the results of this study, in that while there was a positive correlation between compatibility and the adoption of knowledge management systems, the significance level was low.

Compatibility, as defined above, entails both cultural and technological components.

5.3.3 Unsupported hypotheses

The hypotheses about the impact of cost, top management support, the maturity of the organisation and stakeholder pressure were not supported in this study.

5.3.3.1 Cost

The hypothesis about the cost having an impact on the adoption of knowledge management systems by South African municipalities was not supported. Although the different categories of municipalities have different allocations of the budget, with metropolitans having higher budgets than those of the other two municipality categories, all categories of municipalities surveyed showed a higher adoption of the different categories of knowledge management systems, with the exception of Business Intelligence Systems. This means that the cost did not have that much impact in the adoption of knowledge management systems. However, the

number of municipalities that have adopted business intelligence systems was too low. It is possible that there may have been budgetary constraints with the adoption of more specialised knowledge management systems such as Business Intelligence Systems, within smaller municipalities. The minimal, almost insignificant, impact of cost in the adoption of knowledge management systems can be explained by the fact that all South African municipalities get allocated funds every year, a portion of which is used for Information Technology. However, the portion of the funds allocated is proportionate to the size of the municipality. In addition to the allocated budget, some municipalities, especially urban ones, are able to generate revenue, while some rural-based ones cannot.

While the one type of knowledge management system, the GIS, recorded a highest adoption rate across all surveyed municipalities, it must be remembered that this is a basic system which enables one of the basic and core functions of every municipality, which is the storage of information about all municipal entities, infrastructure, buildings, and lands . The variety and number of knowledge management systems that have been adopted vary, because of the cost and functionality.

The paper by Maclennan & Van Belle (2012) is in support of the insignificance of the cost element, at times, in the adoption of technology. The results of their study of the adoption of Service Oriented Architecture(SOA) by South African companies, showed that the cost of the technology did not affect the adoption of SOA positively. The inconsequentiality of cost in the adoption of technology was also corroborated by Jeon et al (2006) after studying and reporting on the determining factors for the adoption of e-business in Korea.

5.3.3.2 Top Management Support

The model proposed that top management support within South African municipalities has a positive relationship with the adoption of knowledge management systems within these entities.

The hypothesis about Top Management Support having a positive impact on the adoption of knowledge management systems by South African municipalities was not supported by the current research.

The academic literature is rich with studies that support the significance of top management support in the adoption of technology (Huang et al, 2008; Sargent et al, 2012; El Shaar et al,

2015). However, some studies either downplay the impact of this variable or exclude it completely. The results of a study on the adoption of the E-Procurement system by municipalities, Veit et al (2011) demonstrated that the strong determinants of the adoption were environmental and technical factors. The study demonstrated a weak consensus about the role of organisational factors, include the top management support (Veit et al, 2011). The insignificance of the top management support was also supported by the results of the study of the adoption of medical records system in European hospitals by Marques et al (2011). In this instance the results demonstrated that organisational factors, including top management support did not influence the adoption of medical records system adoption. In this case the adoption was ascribed to human, technological and environmental factors. Among human factors, the high level of education was listed as a major factor that positively impacted adoption. Thus, the literature reports conflicting results when it comes to top management support. Top management support may therefore be a function of other interacting variables.

5.3.3.3 Maturity

The sum total of user experiences with ICT, together with the organisational disposition to technology influence the rate of adoption of ICT by an organisation (Govender & Pretorius, 2015). In the context of municipalities, past experiences with the adoption of other forms of ICT, can therefore add to the level of maturity of the municipality about ICT matters. Therefore, the richer the experiences about ICT the higher the propensity to adopt other ICT initiatives, which would be knowledge management systems in this regard.

The hypothesis about maturity having an impact on the adoption of knowledge management systems by South African municipalities was not supported by the results of the analysis.

Studies that have been conducted on the adoption of various information technology initiatives across a number of countries have asserted the fact that the maturity of an organisation with regard to information technology is one of the cornerstones for the adoption of information technology by organisations (Sallehudin et al, 2016; Teoh et al, 2017; Maclennan & Van Belle, 2012). Despite this consensus, the literature has some pockets of disagreements. The outcomes of the studies by Veit et al (2011) on the adoption of E-procurement systems by municipalities as well as the one by Marques et al (2011) on the adoption of Medical Records System revealed that the ICT maturity of an organisation is not always a precursor to the adoption of information

technology by organisations. This disagreement may possibly be attributed to the industry and the context where the organisation exists, as well as to other variables.

5.3.3.4 Stakeholder Pressure

The hypothesis about the stakeholder pressure having an positive impact on the adoption of knowledge management systems by South African municipalities was not supported by the results of the analysis.

Contrary to the findings of the study that the stakeholder pressure does have any effect on the adoption of knowledge management systems in the South African local context, the academic literature is overstocked with evidence that support the positive correlation between the two variables. Teoh et al (2017) states that competitor's action towards new strategies/technologies create pressure that positively induce them towards the adoption of these technologies. In a study of the adoption of cloud computing in a Malaysian public sector , Sallehudin et al (2016) found that government regulation and IS external support is mandatory for the adoption of new IT innovation. Pudjianto & Hangjung (2010), in their study of e-Government adoption in developing countries, mentioned the crucial positive role that is played by regulatory and competition environment in technology adoption. This assertion has been supported across a number of countries, technologies and sectors within these countries (Arduin et al, 2008; Attour, 2011;Marques et al, 2011).Despite the aforementioned groundswell of agreement by different authors, Maclennan & Van Belle (2012) reached a different conclusion. After studying the adoption of Service Oriented Architecture(SOA) by South African companies, they found that, in this instance, vendor influence, inter-organisational interaction and industry pressure did not affect the adoption of SOA. The results of this study, with regard to the impact of stakeholder pressure are consonant with the outcome of the study by Maclennan & Van Belle (2010).

It can therefore be argued that stakeholder pressure, while universally acknowledged as a precursor to technology adoption, is at times moderated and affected by other intervening variables.

5.4 Conclusion

The outcome of the study demonstrated that South African municipalities have made good progress in the adoption of knowledge management systems. In addition to this, the results of the research fully supported the hypotheses of size and complexity, partially supported relative advantage and compatibility variables of the TOE model, in the adoption of knowledge management systems by South African local government. The hypotheses of top management support, ICT maturity and the ones within the environmental context were not supported.

CHAPTER 6: CONCLUSION

6.1 Introduction

This last chapter revisits research questions that were posed in Chapter 1. It then presents a summary of the findings obtained from the study and then highlights the implications of these results to both practice and academia. It concludes by touching on the limitations of the study and focus areas for future research.

6.2 Original research questions revisited

The research questions which were the basis of the study, together with their outcome, are revisited.

- The extent to which ***technology factors*** within municipality influenced the adoption or non-adoption of knowledge management systems was the first question the study had to answer. The results demonstrated that technology factors play an important role in the adoption of knowledge management systems in South African local government. The fact that relative advantage, compatibility and complexity were supported support the importance of the technological factors.

- The second research question related to the extent to which ***organizational factors*** within South African municipalities influenced the adoption of knowledge management systems In the context of the South African municipalities , the results of the study showed that only "size", within the organisational factors is important in the adoption of knowledge management systems. Other factors like top management support, organisational readiness, maturity and knowledge about IT systems were ruled out.

- The last research question was about the extent that ***environment factors*** have influenced the adoption of knowledge management systems within South African municipalities. The results have demonstrated that in the South African local government context, environmental factors do not have any effect in the adoption of knowledge management systems.

6.3 Summary of findings

The main finding from the study is that South African local government has made good progress towards the adoption of knowledge management systems. This is evidenced by the high adoption rates of certain types of knowledge management systems such as the GIS, intranet and the document management system.

The other finding was that the size of the municipality is a big contributor to the adoption of knowledge management system. The size of a municipality carries with it adequate resources to adopt any technology. In a South African context, big municipalities are the ones that have adopted a number of knowledge management systems. The other key finding that was supported by the results of the research was that the complexity of the system plays an important, but adverse role in its adoption. The results demonstrated that the less complex the knowledge management system, the higher the rate of adoption. Other factors that were partially supported were the relative advantage of the technology as well as the compatibility of the technology to other systems and to the norms and values of the organization.

6.4 Implications for practice

The results of the survey have implications for the adoption of knowledge management systems by not only South African municipalities, but for organisations in general.

Although the results pointed to size as having a positive relationship with the adoption of knowledge management systems, the size has a number of advantages. These include adequate financial resources, adequate technology, established processes, a variety of skills and an established organizational hierarchy headed by senior management. Arguably, the adoption of knowledge management systems can be successful in any organisation, irrespective of size, if it has the requisite financial, technological and human resources as well as clearly defined business processes.

The results of the study indicated that the **complexity** of knowledge management systems plays an important role in their adoption by municipalities. In other words, the easier the systems are to use, the higher the likelihood of their adoption. The lessons learnt from this study are that IT managers must ensure that the systems they are introducing into the organisation are user friendly (Alam & Noor, 2009). The user friendliness can be enhanced by implementing a thorough and rigorous training and support regime (Rajan & Baral, 2015). This regime can

include IT people that are dedicated to the formal training of users and business users that can be trained as trainers themselves (Alam & Noor, 2009;Kallioranta & Vlosky, 2008). Effective post-implementation systems support processes need to be in place. An example of the aforementioned is a vibrant service desk that will attend to user queries and problems and make an effort to address them immediately.

The variable **relative advantage** was partially supported as a contributor to the adoption of knowledge management systems by municipalities. In practice, this means that the benefits of the new system must be clearly communicated and be demonstrated to the organisation (Darmawan & Keeves, 2002; Mckenna, 2008; Agboh, 2015). In addition to good communication, a strong and effective change management process will have to be implemented to the organisation (Noordin et al, 2013; Kallioranta & Vlosky, 2008).

The variable **compatibility** was partially supported as a contributor to the adoption of knowledge management systems by municipalities. In this instance, the managers of the organisation must ensure that the systems that are being implemented are in line with the practices, norms and goals of the organisation (Kallioranta & Vlosky, 2008; Ramakrishnan & Yasin, 2012). IT managers are to ensure that new applications are compatible with other systems in the organisation. Compatibility, in the technical sense, means that new systems can either be integrated with or interface to other existing systems within the organisation. In addition, new applications must be compatible with existing infrastructure and hardware (Ghobakhloo et al, 2012).

6.5 Implications for academia

This research was based on the TOE framework. The results obtained confirm that , in this instance, both technological and organizational factors play an important role in the adoption of knowledge management systems by South African municipalities. The complexity and size variables were confirmed as negative and positive full determinants of the adoption of knowledge management systems respectively, while relative advantage and compatibility were also partially supported as precursors of successful adoption of the knowledge management systems.

The results of the study partially support the TOE framework. A conclusion can be drawn that the adoption of technology and knowledge management systems in particular, in the context

of South African municipalities is influenced more by some constructs/variables of both the technology and organisations factors, than others. This means that in the context of municipalities if users perceive the technology as relevant to their duties, as user-friendly, and is compatible with existing systems, these are sufficient reasons for the technology to be adopted.

Knowledge management systems vary in terms of complexity from easy to use to complex, and they vary from automating basic and core tasks to automating complex ones, across a number of organisations. Within municipalities, a majority of knowledge systems adopted were those that automated core and routine tasks, and thus made the work of some users easy. The impact of environmental effects, top management support and the maturity of the organisation may have been neutralised by the fact that the utility of knowledge management systems within municipality is self-evident. It is possible that the impact of the environmental and other organisational factors would have been significant, had the type of knowledge management systems, been complex. For example if the study had focussed on Business Intelligence Systems, Big data, Knowledge-Based Systems and Artificial Intelligence Systems, the impact of the afore-mentioned factors may have been significant.

The implications for academia is that the adoption of knowledge management systems across industries will be influenced by different factors e.g. human (Marques et al, 2011) based on the nature and complexity of the knowledge management systems, as well as perceived benefit of such systems.

6.6 Limitations and future research

The study had a number of limitations.

- Although the sample targeted was big enough to have a fairly conclusive result, the response rate was lower than expected, at 33%. Possibly, a response rate of half the respondents may have produced a much more reliable results.

- The targeted respondents within municipalities were not readily available and they delegated questionnaires to other employees, who may either have been junior or were not fully au fait with knowledge management systems. This fact is supported by the contradiction in the answers of the two questions of the dependent variable (generic

question and specific systems based questions). The first general question shows a 50% adoption rate of knowledge management system, while follow up questions, which were based on the adoption of the different categories of knowledge management systems, demonstrate that 90% of at least one knowledge management system across all surveyed municipalities.

- The other contributor to the response rate and quality is the fact that the survey was conducted during the busy November 2016, December 2016, January 2017 period. Co-operation during November and December was not optimal as managers and other employees were looking forward to the festive season. In fact, some were already on holiday and could not participate. The response rate in January 2017 was negatively affected by continuing holidays and the fact than most managers were working on their budgets for the next financial year.

The future research on the adoption of knowledge management system will have to interrogate closely the significance of the size of the municipality versus the organizational factors such as top management support, the maturity of the organization. Further research will have to be conducted on the impact of environmental factors. Since a majority of respondents were delegated by targeted respondents, an attempt will have to be made to limit the level or seniority of respondents to Chief Financial Officers, Chief Information Officers and Chief Knowledge officers.

6.7 Conclusion

The results of the study partially supported the TOE framework in adoption of the knowledge management systems by South African local government. The study also demonstrated that some independent variables like size and complexity are more impactful than others like relative advantage and compatibility in the context of local government.

This concludes the last chapter and the research report.

7. REFERENCES

Agboh, D.K.(2015).Drivers and Challenges of ICT Adoption by SMEs in Accra metropolis, Ghana. Journal of Technology Research, 6:1-16.

Alam, S. S. & Noor,M.K.M.(2009).ICT Adoption in Small and Medium Enterprises:an Empirical Evidence of Service Sectors in Malaysia. *Internal Journal of Business Management*, 4(2):112-125.

Alavi, M. & Leidner, D.E. (2001). *Review*: Knowledge Management and Knowledge Management Systems: Conceptual Foundations and Research Issues, *MIS Quarterly*, 25(1):107-138.

Al Haderi, S.M.(2014).The Infuence of Government Support in Accepting the Information Technology in Public Organization Culture.International Journal of Business and Social Science,5(5):118-124.

Al-Mamary,Y.H.,Shamsuddin,A. & Aziati,N.(2014).Factors Affecting Successful Adoption of Management Information Systems in Organizations towards Enhancing Organizational Performance.*American Journal of Systems and Software*,2(5):121-126.

Al Shaar, E.M., Khattab, S.A., Alkaied, R.N.& Manna, A.Q.(2015).The Effect of Top Management Support on Innovation: The Mediating Role of Synergy Between Organizational Structure and Information Technology. *International Review of Management and Business Research*, 4(2):499-513.

Al-Somali, S.A.(2011). Electronic Commerce Adoption: A Study of Business-to-Business Practices in Saudi Arabia, Doctoral Thesis, Aston University.

Arduini, D., Belotti, F.,Denni,M.,Giungato, G. & Zanfei,A.(2008).Technology Adoption and Innovation in Public Services. The Case of E-Government in ITALY. *Working Papers Series in Economics, Mathematics and Statistics.*

Assegaff, S. & Hussin, A. R. C. (2012).Review of Knowledge Management System As Socio-Technical System, *International Journal of Computer Sciences Issues* ,9(5):129-137.

Attour, A.(2000).Adoption and Regional Diffusion of Innovation in Local Government:Case Study of the Development of e-Government in Lorraine.

Avram, G. (2005).Empirical Study on Knowledge Based Systems, *The Electronic Journal of Information Systems Evaluation*, 8(1):11-20.

Benbya, H. & Belbaly, N.A.(2005).Mechanisms for Knowledge Management Systems Effectiveness: An Exploratory Analysis. *Knowledge and Process Management*, 13(3):203-216.

Bhattacherjee, A. (2012).Social Science Research: Principles, Methods, and Practices 2nd Edition.

Burns, R.B. (2000).Introduction to Research Methods. London: Sage.

Chaffey, D. & White, G.(2010). Business Information Management,2nd Ed, FT Prentice Hall.

Chong, S. & Bauer, C.(2000).A Model of Factor Influences on Electronic Commerce Adoption and Diffusion in Small and Medium-sized Enterprises, *PACIS 2000 Proceedings Paper 23.*

Cudanov, M., Jasko, O. & Savoiu, G.(2010). Interrelationships of Organizational Size and Information Technology Adoption. *Journal of Applied Quantitative Methods*, 5(1):29-40.

Darmawan, I.G.N. & Keeves, J.P.(2002).Two-level Model of Information Technology Adoption in Local Government of Bali. *International Education Journal*, 3(1):47-60.

Durrheim, K. & Wassenaar, D. (2002).Putting Design into Practice. Writing and Evaluating ResearchProposals. Available online at

http://www.academia.edu/13215334/Putting_design_into_practice_writing_and_evaluating_research_proposals.

Evangelista,P.,Esposito,E.,Lauro, V. & Raffa, M. (2010).The Adoption of Knowledge Management Systems in Small Firms, *Electronic Journal of Knowledge Management*, 8(1):33-42 Available online at www.ejkm.com.

Fichman, R.G.(1992). Information Technology Diffusion: A Review of Empirical Research, Available online at
https://www2.bc.edu/~fichman/Fichman_1992_ICIS_IT_Diff_**Review**.pdf

Findik, D. & Tansel, A.(2013). Resources on the Stage: A Firm Level Analysis of the ICT Adoption in Turkey Available online at https://mpra.ub.uni-muenchen.de/65956

Gaffoor, S. & Cloete, F. (2010) Knowledge Management in Local Government: The case of Stellenbosch Municipality, SA *Journal of Information Management,* and 12(1):1-7. Available online at http://www.sajim.co.za.

Ghobakhloo, M., Hong,T.S., Sabouri, M.S. & Zulkifli, N.(2012).Strategies for Successful Information Technology Adoption in Small and Medium-sized Enterprises. *Information* 3:36-67.

Govender, N. M. & Pretorius, M.(2015).A Critical Analysis of Information and Communications Technology Adoption: The Strategy-As-Practice Perspective, Available online at *www.actacommercii.co.za/index.php/acta/article/view/229*

Iacovou, C.L., Benbasat, I. & Dexter,A.S. (1995). Electronic Data Interchange and Small Organizations:Adoption and Impact of Technology.*MIS Quarterly*,19(4):465-485.

Jeon, B.N., Han, K.S. & Lee, M.J.(2006). Determining Factors for the Adoption of e-Business: The Case of SMEs in Korea. *Applied Economics,* 38:1905-1916.

Hassan, N.A., Hayayisuh, N. & Nouri, R.K. (2011).The Implementation of Knowledge Management System (KMS) for the Support of Humanitarian Assistance/Disaster Relief (HA/DR) in Malaysia, *International Journal of Humanities and Social Science*, 1(4):103-112.

Hahn, J.& Subramani, M.R.(2000). A Framework of Knowledge Management Systems:Issues and Challenges for Theory and Practice.21st International Conference on Information Systems(ICIS 2000),Brisbane,Australia.

Hollenstein, H.(2002).Determinants of the Adoption of Information and Communication Technologies(ICT) Available online at www.sciencedirect.com/science/article/pii/S0954349X0400017

Huang, L.K., Janz,B.D. & Frolick,M.N.(2008). A Comprehensive Examination of Internet-EDI adoption. Information Systems Management,25(3):273-286.

Kallioranta, S.M., & Vlosky, R.P.(2008). Inter-organizational Information and Communication Technology Adoption in the Business-to-Business Interface. *Louisana Forest Products Development Center* Working Paper #84

Karadsheh, L., Mansour,E.,Alhawari,S.,Azar, G. & El-Bathy, N.(2009). A Theoretical Framework for Knowledge Management Process: Towards Improving Knowledge Perfromance. *Communications of the IBIMA.* 7(1):67-79.

Korpelairen, E. (2011). Theories of ICT System Implementation and Adoption – A Critical Review, Available online at *https://aaltodoc.aalto.fi/handle/123456789/5019*

LGAT, (2003).Information and Knowledge Management: National Scoping Study Report Available online at http://www.lgat.tas.gov.au/webdata/resources/files/Information_Knowledge_Management_Report_v1a.PDF .

Lippert, S.K. & Govindarajulu, C.(2006). Technological, Organizational, and Environmental Antecedents to Web Services Adoption, *Communications of the IIMA*,6(1):147-160.

MacLennan, E. & Van Belle, J.(2012). Factors Affecting The Organizational Adoption Of Service-Oriented Architecture, *PACIS 2012 Proceedings*. Paper 21.

Malhotra, Y. (2004). Why Knowledge Management Systems Fail? Enablers and Constraints of Knowledge Management in Human Enterprises. Available online at www.brint.org/kms.pdf .

Mangula, I.S., Van de Weerd,I. & Brinkkemper,S.(2014). The Adoption of Software-As-Service: An Indonesian Case Study, *PACIS 2014 Proceedings*.Paper 385.

Marchand, D.A., Davenport, T.H.& Dickson, T.(2000).Mastering Information Management ,Prentice Hall Financial Times.

Maree, K. (2007). First Steps in Research, Van Schaik Publishers.

Mathi, K. (2005).*Key Success Factors for Knowledge* Management .Master Thesis, University of Applied Sciences/Fh Kempten, Kempten, Germany Available online at http://hosteddocs.ittoolbox.com/KM21105.pdf

Mayan, M.J. (2001).An Introduction to Qualitative Methods: A Training Module for Students and Professionals. University of Alberta: International Institute for Qualitative Methodology.

Mbhalati, O.J. (2012). The Genesis of the Knowledge-Based View, *Journal of Knowledge Management Practice*, 13(2).

Marquees, A., Oliveira, T.,Dias, S.S. & Martins, M.F.O.(2011).Medical Records System Adoption in European Hospitals. *Electronic Journal Information Systems Evaluation* 14(1): 1-30.

McKenna, F.(2008).A Knowledge Management System: *A Discourse Copyright Knowledge Corporation.*

Mothamaha, W.B. & Govender, K.K. (2014).Exploring the Role of Knowledge Management in Improving Service Operations-The Case of the Select Departments in the City of Johannesburg, South Africa, *International Journal of Managerial Studies and Research,* 2(5):1-8 Available online at www.arcjournals.org .

Musawa, M.S. & Wahab, E.(2012).The Adoption of Electronic Data Interchange(EDI) technology by Nigerian SMEs: A conceptual framework. *Journal of Business Management and Economics*,3(2):55-68.

Nagy, D., Collins, R. & Nord, W.(2014).Extend your TOEs-An Organizational Approach to IT. *Proceedings of the Southern Association for Information Systems Conference, Macon, GA, USA* March 21st-22nd , 2014.

Olivier, S. O. (2009).Information Technology Research: A Practical Guide for Computer and Informatics.3rd Edition.

Oliviera, T. & Martins, M.F.(2011). Literature Review of Information Technology Adoption Models at Firm Level. *The Electronic Journal Information Systems Evaluation*, 14(1):110-121.

Omona, W., Lubega, J.T. & Weide, T. (2012).Enhancing Knowledge Management Using ICT in Higher Education: An Empirical Assessment, *Journal of Knowledge Management Practice*, 13(3).

Ozturk, A.B., Palakurthi, R. & Hancer, M.(2012).Organizational-level RFID Technology Adoption in the Hospitality Industry. *Tourism Analysis*,17(1):629-642.

Park, Y. & Rim, M.(2011).The Relationship Analysis of RFID Adoption and Organizational Performance. *The Sixth International Conference on Systems and Networks Communications. Available online at https://www.thinkmind.org/download.php?articleid=icsnc_2011_4_10_20170*

Peansupap, V. & Walker, D.H.T.(2005).Factors Enabling Information and communication Technology Diffusion and Actual Implementation in Construction Organizations. Available online at *www.itcon.org/data/works/att/**2005**_14.content.02646.pdf*

Pudjianto, B. & Hangjung, Z.(2009).Factors Affecting e-Government Assimilation in Developing Countries.*4th Communication Policy Research,South Conference,Negombo,Srilanka.*. Available on at https://ssrn.com/abstract=1553651 .

Ramakrishnan, K. & Yasin, N.M.(2012).Knowledge Management System and Higher Education Institutions. *International Conference on Information and Network Technology*, 37:67-71.

Rajan, C.A. & Baral, R(2015).Adoption of ERP system:An empirical study of factors influencing the usage of ERP and its impact on end user.*IIMB Management Review*,27:105-117.

Rogers, E.M. (1983)).Diffusion of Innovations, 3rd Ed New York:Free Press,1983.

Rogers, E.M. (1995).Diffusion of Innovations,4th Ed New York:Free Press,1995.

Sallehudin, H., Razak, R.C. & Ismail, M.(2016).Determinants and Impact of Cloud Computing Implementation in the Public Sector. *Journal of Advances in Information Technology*.7(4):X-Y.

SALGA STRATEGY 2012-2017 Available online at http://www.salga.org.za

Sargent, K., Hyland, P. & Sawang, S.(2012).Factors Influencing the Adoption of Information Technology in a Construction Business. *Australasian Journal of Construction Economics and Building*,12(2):72-86.

Scott, W.R. & Christensen, S. (1995). The Institutional Construction of Organizations: International and Longitudinal Studies, Thousand Oaks, CA, Sage Publications.

Tehrani, S.R.(2013). Factors Affecting the Adoption of Cloud Computing by Small and Medium Sized Businesses, Theses and Dissertations, Paper 1179.

Teoh, A.P., Muthuveloo, R. & Lim, W.P.(2017).Factors Influencing Sustainable Information Technology Adoption among Manufacturing Firms: Evidence from Malaysia. *The Social Sciences*, 12(2):245-248.

Tornatzky, L.G. & Fleischer, M. (1990).*The Processes of Technological Innovation*. Lexington Books, Lexington, Massachusetts.

Venter, A., Van Der Walt, C., Phutiagae, K., Khalo,T., Van Niekerk,D. & Nealer, E. *Municipal Management: Serving The People*.Juta & Company,2007.

Veit, D.J., Parasie, N.P. & Huntgeburth, J.C.(2011).E-Procurement Adoption at the Municipal Level: Influence of Organizational, Technological and Environmental Factors.*Proccedings of the 44th Hawaii International Conference on System Sciences-2011.*

Zabadi, A.M.(2016).Adoption of Information Systems(IS):The Factors that Influence IS Usage and Its Effect on Employee in Jordan Telecom Sector. International Journal of Business and Management,11(3):24-36.