Exploring the Adoption of Cloud Computing as a Business Strategy: A Bulawayo Small to Medium Enterprises (SMEs) Study

by

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ATTESTATION OF AUTHORSHIP

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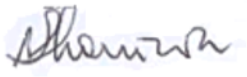
I declare that **Exploring the Adoption of Cloud Computing as a Business Strategy: A Bulawayo Small to Medium Enterprises (SMEs) Study** is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references.



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ABSTRACT

Technology has removed all political boundaries, and has significantly transformed the way business is conducted in the modern age. The world has become a global village in which, by the mere click of a mouse button, anyone can reach any market in any part of the world. This however, has introduced stiff competition among businesses worldwide for markets, where the most affected are SMEs in developing countries. Research has shown these SMEs lack capital to invest in IT in order to improve their competitive advantage.

Cloud computing is an emerging computing paradigm, which has been touted as the panacea to help SMEs in developing countries become competitive. For SMEs to be globally competitive, they need to transform and adopt ICT, and use it effectively. A great deal of research has been carried out on the benefits and barriers to ICT adoption by SMEs in both developing and developed countries. The findings obtained from studies from a single country cannot be considered 'one size fits all' and thus, cannot be applied to all countries, due to the difference in geopolitical and economic development trajectories. Zimbabwe is a developing country, and by virtue of its unique history cannot be compared to any other country in the world. This means that no research conducted outside the borders of Zimbabwe can truly be generalised to SMEs in the country.

This study explored the readiness of SMEs in Bulawayo (Zimbabwe) to adopt cloud computing as a business strategy. The study used the NOIIE (which stands for National e-readiness, Organisational preparedness, Industrial relationships, Internal resistance and External influence) conceptual framework to assess the readiness of SMEs in Bulawayo in embracing cloud computing.

The study undertook a positivist philosophy, underpinned by quantitative methodology. Questionnaires were sent to systematically sampled SMEs in order to answer the research questions. The data was then collected and analysed by SPSS.

The findings revealed that most SMEs are notably young and small, and therefore not mature enough to have foundation for execution. The findings also revealed that top management in SMEs is either not willing to commit or do not have the resources to put in necessary infrastructure to migrate to cloud computing. This indicates a possible lack of awareness of the benefits of the cloud to SMEs. The government has not done enough to promote the use of cloud by SMEs. Power cuts and expensive Internet access exacerbate the plight of the SMEs to move to the cloud. Lack of visible cloud service providers makes the situation even worse.

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ACRONYMS

1. **E-readiness** Electronic readiness
2. **GDP** Gross Domestic Product
3. **IaaS** Infrastructure as a Service
4. **ICTs** Information Communication Technologies
5. **IT** Information Technology
6. **MICT** Ministry of information, Communications and Technology
7. **NOIIE** National e-readiness, Organisational preparedness, Industrial relations, Internal resistance, External influence.
8. **NIST** National Institute of Standards and Technology
9. **PaaS** Platform as a Service
10. **SaaS** Software as a Service
11. **SLA** Service Level Agreements
12. **SMEs** Small and Medium Enterprises
13. **SMMEs** Small, Medium and Micro Enterprises
14. **SPSS** Statistical Package for Social Scientists
15. **Zimra** Zimbabwe Revenue Authority
16. **Zimtrade** Zimbabwe Trade

CHAPTER 1:

INTRODUCTION

As Armbrust has noted, “the long dreamed vision of computing as a utility is finally emerging” (2009:25). According to Hinde and Van Belle (2012:1) cloud computing has fundamentally changed the information technology (IT) landscape for small, medium and micro-enterprises (SMMEs). SMEs need to adopt cloud computing to remain relevant and competitive in the context of new and more competitive markets that have emerged due to globalisation (Makena, 2013:517). Organisations that fail to adapt or lack technological tools to access global markets will disappear in their early years. SMEs in developing countries are generally too under-capitalised and poorly resourced to continue with traditional software models in which they are locked-up to a specific vendor, and restricted by user-licences, which attract licence fees (Lin & Chen, 2012:534; Hinde & Van Belle, 2012:6; Sahandi et al., 2013:8; Yeboah-Boateng & Essandoh, 2014:14). Cloud computing is perceived to dramatically lower the cost of technology for smaller firms, by allowing them access to hardware, with no upfront capital investments (Hinde & Van Belle, 2012:6; Yeboah-Boateng & Essandoh, 2014:13; Sahandi et al., 2013:2; Makena, 2013:517).

However, besides these perceived benefits, how ready are the SMEs in Bulawayo to migrate to cloud computing? This study explored the readiness of SMEs to embrace cloud computing, along with the benefits of cloud computing, and barriers that hinder SMEs in Bulawayo from migrating to it. The study highlighted the current state of IT infrastructure of SMEs in Bulawayo. Bulawayo is the second largest city in Zimbabwe, and has many SMEs, which are struggling to compete regionally. Bulawayo used to be hub of industrial development in Zimbabwe, but industries virtually collapsed following firm closures that took place at the height of the 2007-2008 hyperinflationary environment (Nyambayo, 2014:5). Many people lost their employment during those dark years of economic recession, and today, many SMEs in Bulawayo are still struggling to survive. There is a need to support SMEs, to bring Bulawayo back to its heydays the country’s industrial hub. Block (2011:3) has noted that “most businesses are, however, undercapitalised” and hence, cannot buy state-of-the-art technology to compete on the

global market. Several researchers have extolled the virtues of cloud computing as a technology that is suitable for SMEs (Choo, 2010, Abdollahzadehgan et al., 2014, Sharma *et al*., 2010; Kshetri, 2010) to be competitive on the global market. Thus, the study investigated the readiness of SMEs in Bulawayo to embrace cloud computing as a business strategy.

The study utilised the readiness assessment model proposed by Ogunyemi and Johnston (2012:4). The researcher used a conceptual readiness framework adapted from Ogunyemi and Johnston (2012:4) called National e-readiness, organisational preparedness, industrial relationships, internal resistance and external influence (NOIIE) to assess the readiness of SMEs in Bulawayo to adopt to cloud computing.

BACKGROUND TO STUDY

Globalisation of world markets has ushered in new opportunities and challenges for enterprises both big and small in both developed and developing countries (Kapurubandara, 2006:1). Due to globalisation, the global economy and society continue to become more and more knowledge based and integrated (Song, 2011:68), and the traditional way of doing business has become increasingly inadequate. ICT has altered the dynamics of doing business in the world market.

Competition for markets and customers has become stiffer, and only organisations that are 'fit' can weather off the competition to survive (Shahandi, 2013:1). The hardest hit enterprises are small to medium enterprises (SMEs) in developing countries like Zimbabwe, and yet, these SMEs contribute significantly to the economies of their respective countries (ibid.). According to Zaied (2012:9), "SMEs contribute significantly to the economies of the African continent, representing 90% of all business and providing the main source of jobs and income for African people."

According to Khan *et al*., (2011:216), "building, operating, maintaining, and updating traditional ICT infrastructure require financial resources for up-front infrastructure costs and IT administration expenditures," but unfortunately, due to their small size and lack of capital (Kshetri, 2010:47; Yeboah-Boateng & Essandoh, 2014:16), SMEs in developing countries, like Zimbabwe find it difficult to invest in ICT. The dynamism of the ICT developments necessitate that organisations should also transform and keep up with the

new ways of doing business (Khan et al., 2011:216). These changes, according to Khan *et al*., (2011:216) will involve migrating from organisations buying and maintaining their own IT infrastructure, to a new model known as cloud computing, in which IT is provided as utility without upfront expenditure on IT infrastructure (Gounder, 2010:3). Cloud computing can help SMEs to overcome distance and geographical boundaries so as to reach any global markets.

According to Makena (2013:517), cloud computing has been praised "as a new technology that can provide several advantages, both strategic and operational to its adopters." The cloud paradigm promises a shift from heavy IT investment by an organisation to an organisation buying and renting IT resources from a cloud provider on a pay-per-use basis (Dwivedi & Mustafee, 2010:673; Lin & Chen, 2012:534).

Besides the cost-saving benefits, cloud also offers agility, scalability and efficiency resource consolidation and green IT (Chang *et al.*, 2013:524). Besides some concerns about the cloud, it however, seems to be the solution for technologically and capital-starved SMEs to remain competitive. The question remains, however, as to how ready these SMEs are to adopt cloud computing as a business strategy. Do they have enabling infrastructure to migrate to cloud computing? Manuere *et al*. (2012) have researched on barriers to the adoption of ICT by SMEs in Zimbabwe and similar studies have been carried in Botswana (Shemi, 2012) and South Africa (Hinde and Van Belle, 2012; Madisha and Van Belle, 2009), to just mention a few.

This research extended beyond barriers affecting SMEs to adopt ICT as a business strategy, and to try and assess the readiness of SMEs in Bulawayo to adopt cloud computing.

STATEMENT OF THE RESEARCH PROBLEM

In Zimbabwe, soon after political independence, many multinational companies that sustained the economy migrated to other countries (Chirisa *et al*., 2012:122). The country faced many economic challenges; chief among these was unemployment rate, which drastically increased to over 70%, where the country was unable to meet its international obligations to the World Bank and the International Monetary Fund (IMF)

(Chisasa, 2013:153; Maunganidze, 2013:3). The economy base was supported by only larger companies, without SMEs. The government later realised that SMEs contribute immensely to the Gross Domestic Product (GDP) and needed to be empowered (Maunganidze, 2013:3). SMEs are said to be the lifeblood of a vibrant economy (Sharma *et al*., 2012:144).

Black empowerment and indigenisation policies implemented by the Zimbabwean government since independence in 1980 have resulted in the sprouting up of a number of SMEs across virtually all sectors of the economy (Nyangara, 2013:219). Unfortunately, these SMEs have to compete globally to survive, in a turbulent economic environment (Mpofu & Chigwende, 2013:53). Most SMEs still use the traditional methods of doing business, namely manually creating spreadsheets, without efficient processes for organising their data and information.

The prohibitive IT investment costs cause these under-capitalised SMEs to continue to use their traditional ways of doing business, despite having to compete in the global markets (Kshetri, 2010:47; Abdollahzadehgan *et al*., 2014:67). Most SMEs disappear in their infancy, because they fail to respond to the challenges of global competitiveness (Abdollahzadehgan *et al*., 2014:67). Moreover, in recent years, global recession has made it difficult for SMES to understand and respond to the volatile global economic environment, especially those in developing countries (Ojukwu, 2006:50; Ismail et al, 2011:1).

With cloud computing bringing in new ways of doing business, SMEs should take advantage and consider migrating to it (Makena, 2013:517). However, there are many questions that need to be asked about the state of affairs of SMEs in Bulawayo. Are the SMEs ready to embrace cloud computing as a strategic choice of competitive advantage? What is the state of their preparedness (SMEs) to embrace cloud computing (state in terms of level of their technology)? Are there necessary policy frameworks and infrastructure that enable the SMEs easy access to cloud computing and other emerging technologies? What challenges if any, are faced by SMEs in Bulawayo to migrate to cloud computing?

Many researchers have concentrated their research on barriers, threats and benefits of cloud computing to developing countries. Their findings however reduce the differences between respective countries, regardless of their level of economic development, their political history and their other unique environmental factors that affect developing countries. This research sought to explore the level of preparedness of SMEs in Bulawayo to embrace cloud computing as a business strategy.

1.3 THE PURPOSE OF STUDY

Limited information on adoption of cloud computing by SMEs in Bulawayo in particular and Zimbabwe in general provides numerous research possibilities. In this study, the focus was on exploring the readiness of SMEs in Bulawayo to adopt new technology paradigm; with cloud computing as a business strategy. To this end, the study looked at current level of ICT utilisation and its benefits, and highlighted barriers that affect adoptability of the cloud by SMEs.

The main objective of the study was to explore the general state of preparedness of SMEs for the adoption of cloud computing as a business strategy. The following questions were addressed:

1. What are the benefits of cloud computing to SMEs?
2. What are the barriers that hinder SMEs in the adoption of cloud computing as a business strategy?
3. What are the factors that can affect the adoption of cloud computing by SMES in Bulawayo?
4. What is the state of readiness of SMEs in Bulawayo to adopt cloud computing?

The desired outcome of this study was to contribute positively to managers, owners of SMEs and the city council to reflect upon whether they have laid sufficient ground for SMEs to migrate to cloud computing. The findings of this study provide the base for the current state of IT infrastructure of SMEs in Bulawayo. The findings would help the stakeholders, researchers, practitioners and government to craft enabling policies and continue to provide enabling environment to encourage SMEs to use the cloud as a business strategy.

1.4 RESEARCH QUESTIONS

The main research question identified was:
What is the state of preparedness of SMEs in Bulawayo to adopting cloud computing as a business strategy?

The aim of the main question was to gain an overall understanding of the general state of preparedness of SMEs to adopting cloud computing as a business strategy. The question sought to highlight benefits of cloud computing, barriers and factors that influence the adoption of cloud computing. It also sought to discuss the state of IT infrastructure of different SMEs as a way of assessing how ready they were to adopt cloud computing. The main research question is divided into the following sub-research questions (SRQ).

SRQ1: What is the state of readiness of SMEs in Bulawayo to adopt cloud computing as a business strategy?
SQR1 identified the state of readiness by looking at the following factors**:** national e-readiness, organisational readiness, industrial relations, internal resistance and external influence to adopt cloud computing.

The second SRQ investigated factors that can affect the adoption of cloud computing by SMEs in Bulawayo and is defined as:

SRQ2: What are the factors that can affect the adoption of cloud computing by SMES in Bulawayo?

SRQ2 identified factors that encourage SMEs to migrate to cloud computing.

1.5 RESEARCH OBJECTIVES

The main objective (MO) of the research is:

To explore the state of readiness of SMEs in Bulawayo to adopt cloud computing. To meet the objectives, quantitative method was used. Questionnaires were distributed to people who occupy top positions like owners, managers and chief executive officers of the sampled SMEs to complete. SPSS package was used to analyse the data.

The main objective was split into two sub-objectives (SO), which are listed as follows:

SO1. To explore the state of readiness of SMEs in Bulawayo to migrate to cloud computing; and

SO2. To investigate factors that affect cloud computing adoption by SMEs in Bulawayo.

1.6 SIGNIFICANCE OF THE STUDY

Understanding the current status of the adoption of ICT by SMEs helps to evaluate the degree of ICT usage in Bulawayo in particular, and in Zimbabwe in general. This was premised on the assumption that usage of ICT in Bulawayo is a microcosm reflection of what happens nationwide. The study contributes to the body of knowledge of cloud computing adoption in Bulawayo, (Zimbabwe) and to developing countries in general. It was also intended that the quantitative phase of the study would contribute to the statistics of readiness of SMEs to adopt cloud computing and the general ICT use in Bulawayo.

The study presented perceived barriers and perceived factors affecting adoptability of cloud computing by SMEs in Bulawayo. The assessment helped to gather information about ICT utilisation by SMEs, where the findings may be useful to managers, SME owners, local authorities and government. Owners and managers would be encouraged to provide necessary infrastructure and other measures to help their organisations to migrate to cloud computing. The findings may assist the local governing authorities and government to put in policies, proper infrastructure and incentives to encourage SMEs to migrate to the cloud. The findings could help government to improve competitive strength of SMEs in the country compared to those in the region and beyond.

Several studies have been carried out on ICT adoption in developing countries. The area of ICT utilisation in general, and cloud computing in particular in Bulawayo SMEs remains a lacuna in present research. The research would also make a contribution by suggesting ways by which Bulawayo SMEs can adopt ICT and effectively utilising it particularly the cloud in their respective businesses to contribute the socio-economic advancement of the region. The findings of the survey could stimulate other researchers to replicate the survey in other regions of developing countries.

1.7 LIMITATIONS OF THE STUDY

The study was focused on investigating the readiness of small to medium enterprises (SMEs) in Bulawayo to embrace cloud computing as a new technological strategy for doing business. The study highlighted some benefits of cloud computing and the barriers SMEs face to adopt this relatively new technology. Data was collected from owners of SMEs, as well as managers and supervisors who are on strategic level of management, because they can influence change within their organisations. Their influence can help to evaluate the readiness of their organisations to adopt cloud computing. The study looked at the whole spectrum of SMEs, with at least one but less than 300 employees. The study focused on different SMEs in Bulawayo, regardless of line of business in which the SMEs were engaged. Employees in the SMEs were not involved in this study, because they were considered not to have direct influence on policy within the organisation.

1.8 ETHICAL ISSUES

Ethical issues refer to assuring that the dignity of human participants is respected, and that it is not abused or violated in the search for knowledge, scientific, or, more mundanely, for career advancement (Blanche *et al*, 2012:77). Ethical issues refer to the rights of people who were the respondents in the survey. They are concerned with honesty and fairness on the part of the researcher. The researcher put the following in place to treat ethical issues:

- informed respondents of the right to withdraw in the middle of the research;

- assured the respondents of confidentiality and anonymity on their responses and that no-one would be able to identify who the respondent was, hence no identity particulars were needed on the questionnaire;
- avoided coercion of potential respondents to participate in the study;
- informed respondents of the right to participate or not to do so;
- informed the respondents of the purpose of research;
- informed the participants about the purpose of research and that that there were no economic benefits that would accrue neither to the researcher nor the respondents so that their participation was voluntary; and
- the designed questionnaire was sensitive on the use of language especially with regards to race, ethnicity and use of other words that are derogatory to some section of the population.

1.9 RESEARCH STRATEGY

Oates (2006:35) defines a strategy as your overall approach to answering your research question. There are many strategies one can use to answer research questions. This research used survey as a strategy to explore the readiness of SMEs in Bulawayo to adopt cloud computing as a business strategy. The study covered many SMEs, spread over a large, geographically dispersed location. The survey was the best strategy to use to involve as many SMEs as possible to participate in the study. With this strategy, the researcher was able to get same information from several SMEs in the sample at the same time. The survey as a strategy "is probably the best method available to social scientists interested in collecting original data for describing a population too large to observe directly" (Babbie and Mouton, 2012:232).

Surveys are very much associated with a positivist paradigm. According to Neuman (2000:66), "positivism sees social science as an organised method for combining deductive logic with precise empirical observations of individual behaviour in order to discover laws that can be used to predict general patterns of human activity." According to De Villiers (2005:112), the positivist paradigm views knowledge as being absolute and very objective and that a "single objective reality exists external to human beings."

Positivist research uses largely quantitative methods, which assign numerical values to data and use statistical methods to analyse the data (Oates 2006:35; DeVillers, 2005:112). The study used systematic sampling and findings from the sample were used to generalise to a wider population. The detailed research methodology was presented in the third chapter of the study dedicated to research methodology.

1.10 DISSERTATION STRUCTURE

This dissertation is structured as follows:

Chapter 1: Introduction

This chapter was an introductory chapter and outlined the background to the problem, dissertation statement, purpose of study, research objectives and research questions, significant of study and a brief mention of research approach. The chapter also outlined scope of study and limitations of the study. Ethical considerations were also outlined. It closed by highlighting the structure of the dissertation and summary of the first chapter.

Chapter 2: A review of related literature.

This chapter provided a comprehensive review of related literature on cloud computing utilisation by SMEs. It highlighted the current status of research on benefits of cloud computing and barriers to adoption of cloud computing by SMEs, hence addressed the first and second research questions. It also discussed the framework that guided this research on preparedness of SMEs to adoption of cloud computing by SMEs.

Chapter 3: Research design and methodology

This chapter dealt with research design and methodology. It covered the following aspects: the research design, population selection and sampling instruments, data collection methods and procedures.

Chapter 4: Analysis of Research findings

This chapter presented research findings on the sample of SMEs surveyed.

Chapter 5: Discussion of the research findings

This chapter presented a discussion of research findings, by comparing findings from literature and sampled SMEs.

Chapter 6: Recommendations and Conclusions

The chapter concluded this dissertation summarising the research findings and proposed recommendations for further research.

1.11 CHAPTER SUMMARY

The chapter espoused and gave a background to study. The study looked at readiness of SMEs in Bulawayo to embrace cloud computing as a business strategy. In pursuance of that, the chapter highlighted the purpose of study, the research objectives and research questions. The chapter also briefed on significance of study, research paradigm and ethical considerations were also outlined. The next chapter explored literature reviews on the studies that have already been carried out on the readiness of SMEs to adopt cloud computing as a business strategy.

2. LITERATURE REVIEW

2.1 INTRODUCTION

Due to globalisation, economies worldwide have been transformed into knowledge-based economies, thanks to the proliferation of cutting edge ICTs (Kapurubandara & Lawson, 2006:1). Organisations, no matter their size, can take advantage of emerging technologies to carve out their own market niche–not just locally, but also globally (Makena, 2013:517; Alam & Noor, 2009:112). The emerging technologies help organisations to be more innovative and more competitive, while at the same time, becoming more cost effective (Abdollhzadehgan *et al*, 2010:67; Sahandi *et al*, 2013:2; Makena, 2013:517). Despite the advent of these welcoming developments of new technology, Small to Medium Enterprises (SMEs) in developing countries still face challenges to reach the global market. Many researchers have shown that SMEs in developing countries lack the capital to invest in ICT and other emerging technologies (Yeboah-Boateng & Essandoh, 2014:14; Abdollhzadehgan *et al*, 2010:67; Sahandi *et al*, 2013:5). One way of circumventing this challenge is to embrace and migrate to cloud computing, which is a relatively new technology on the market. Kannabiran and Dharmalingam (2012:190) note that "although cloud computing has many advantages for SMEs companies, there are also some drawbacks related to this new phenomenon."

This chapter defines and highlights the importance of SMEs to the economy of a country. The chapter goes on to define cloud computing and highlights different models. Benefits and barriers of adopting cloud computing by SMEs are also explored. Lastly, the chapter ends by looking at the factors affecting adoption of cloud computing by SMEs and highlights NOIIE framework factors used to assess SMEs' readiness to migrate to cloud computing.

2.2 DEFINITION OF SME

Evidence from literature reveals that there is no universally accepted definition of SME. Every country, depending on its economic developmental level, defines SME differently. However, there are common terms inherent in all the definitions, which include the

number of employees, annual turnover, and sometimes management style (Ismail *et al*., 2011:1; Kapurubandara & Lawson, 2009:3). Chichoni (2013:6), defines an SME "as a small company with one to 40 employees, annual turnover of over US$5000 to US$500 000, and a medium-sized company as one with 41 to 75 employees, with an annual turnover of between US$1 million and US$2 million." Chirisa (2012: 23), defines a small to medium enterprise (SME) as "a company employing between 25 and 200 people, with a realistic potential to export its product(s)."

The small and medium enterprises sector is a big player in the Zimbabwean economy, and is estimated to contribute an estimated 60% of the GDP and 50% of total employment (Zimbabwe Government, 2011:167). SMEs are an important part of most emerging economies. According to Hinde and Van Belle (2012:1), SMEs in South Africa "contribute 56% to private sector employment and 36% of the GDP." According to Mashinganidze (2013:4), the contribution of SMEs to economic activities helps to improve the economic outlook of a country, such that many people would experience a better way of life. These assertions emphasise the importance of SMEs to a country's economy and to the betterment of living conditions of people in a country.

According to Madisha and Van Belle (2009:3), SMEs face challenges notably inefficient, unreliable and unaffordable and very expensive ITC infrastructure. The survival of these types of organisations in the current volatile and dynamic market is becoming risky, and very uncertain (Msanjila and Kamuzora, 2012:68). They further note that, increasing market competitions, current government "tendencies towards trade liberalization [sic] and globalization [sic], scarce resources and changes in customers' demands, volatile business opportunities" are among the key factors catalysing the demise of SMEs (ibid.). With the Zimbabwean economy in stagnation (as at June 2014), SMEs need to be helped to be more productive and efficient, as this would not only be beneficial to SMEs, but would also cascade down the whole economy. SMEs need to be innovative, and must put forward sustainable approaches to survive and to be competitive. One strategy for SMEs to be more efficient and be present in the economy is to use appropriate Information and Communication Technologies (ICT). ICTs give SMEs competitive edge and bring in new improved ways of managing and organising a business (Makena, 2013:517; Yeboah-Boateng & Essandoh, 2014:14; Ismail *et al*., 2011:2; Alshamaila *et al*., 2013:2). Zimbabwe ICT policy for 2012 to 2015 aims at promoting use of ICT by

SMEs to achieve 10% ICT usage every year (Zimbabwe ministry of Information, Communications and Technology (MICT) Planning Document, 2010:21).

Cloud computing is a relatively new computing paradigm, which SMEs can adopt to reduce costs and access latest technology without capital expenditure (Misra & Mondal, 2011:506; Choo, 2010:2). According to Khan *et al*. (2011:3) estimate that a total of 70% of IT budgets are used to maintain traditional IT systems (computers, storage, servers and networks) and labour costs, but a massive 85% of IT systems are unutilised and remain idle. According to Sahandi *et al*., (2013:1) "cloud computing has the potential to play a major role in addressing inefficiencies and make fundamental contribution to the growth of enterprises mainly for SMEs." With cloud computing, SMEs become more agile and adapt quickly to changes in business environment and hence become more competitive (Sharma *et al.*, 2010:144). Knowledge-based economies have put customer needs at the forefront, and hence, customers now demand improved quality of service (Alshamaila *et al*., 2013:2). Companies need to adapt to these demands to remain afloat.

There are several definitions of cloud computing. Below four definitions are detailed:

1. The US National Institute of Standards and Technology(NIST) (2009) cited in Mudge (2010:1) defines cloud computing as a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g. networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.

2. Misra and Mondal (2011:1) define cloud computing as "collection disembodied services accessible from anywhere using any mobile device with an Internet connection, provided by a type of parallel and distributed system of virtualised computers that are interconnected" and that can be according to Alshamaila *et al*., (2013:2), "dynamically provisioned and presented as one or more unified computing resources based on Service-Level Agreements (SLAs) established between the service provider and the user."

3. Khajeh-Hussein et al. (2011:447) define cloud computing as a “computing product that is owned to a computing as a service delivered to consumers over the Internet from large-scale data centres or ‘clouds’.”

4. Sultan (2010:110) defines cloud computing as a “cluster of distributed computers (largely vast data centres and servers forms), which provide on-demand resources and services over a networked medium (usually the Internet).”

All these definitions have a common theme, namely that cloud computing is a service provisioned to customers over the Internet on demand. The data is pooled somewhere in the ‘cloud’ and customers can access their data from anywhere at any given time.

2.4 CLOUD DEPLOYMENT MODELS

The following section describes different models via which cloud computing can be deployed, which is particularly important to SMEs, such that they know different deployment models, and then decide which cloud model they can migrate to.

2.4.1 Public cloud

According to Chang *et al.,* (2013:524) in a public cloud, the service provider owns the infrastructure and will be responsible for maintenance and all other cloud operations.

With this model, organisations are not responsible for the deployment and maintenance of the infrastructure. This option is cheaper especially for SMEs who may not have the financial muscle to use other expensive models. The challenge is that the service provider is in charge of keeping data of an organisation, the question of trust and security is raised (Chang *et al.,* 2013:524). However, according to Aleem and Sprott, (2013:11) some organisations can consider running non-critical applications in the public, and keep those services critical to the organisation in their private cloud, so that they can maintain control.

2.4.2 Private cloud

This is a cloud that is managed within an organisation. Chang *et al.* (2013:524) describe it as a bespoke cloud service that is deployed within an organisation for internal users only. Private clouds attract those organisations that require having more control over their data (Aleem and Sprott, 2013:10). When considering cloud-based storage, the organisation is likely to be concerned with security of its data, and due to sensitivity of its data, the organisation feels that it cannot cede control of its data to a third party (Chang et al., 2013:524). Durowoju *et al*. (2011:246) note that although private clouds are secure and reliable, they are perceived to be very expensive, and most SMEs do not have the financial muscle to join this type of the cloud.

2.4.3 Community cloud

Marston *et al*. (2011:178) describe this as a cloud controlled and used by a group of organisations that have shared interests, for example, specific security requirements or a common mission. This can mean that SMEs with shared interests can band together and form this type of a cloud (ibid.). Aleem and Sprott, (2013:11) have observed that this kind of cloud suits organisations that are subject to regulatory or legal limitations both nationally and locally.

2.4.4 Hybrid cloud

According to Aleem and Sprott (2013:10), a hybrid cloud is made up of two or more clouds (private, community or public) which are developed to serve a specific purpose. In this type of cloud, an organisation uses part of public and part of private to deliver a solution to the organisation (Chang *et al*., 2013:524). This type of cloud is best suited for organisations that want to cut down on costs whilst at the same time maintaining data security. This, however, according to Chang *et al*. (2013:524), is difficult to integrate, and it is difficult to implement different cloud architectures.

SMEs are faced with daunting task of choosing which deployment model to use. Keung and Kwok (2012:23), observe that IT maturity of SMEs helps to choose a deployment model. SMEs with high standardisation and automated business processes have high level of IT maturity, and can utilise private cloud (Keung and Kwok (2012:23). Public

cloud is a better choice for SMEs, with low IT maturity, because they are still growing, and with time, their IT requirements may change (Keung and Kwok, 2012:23).

2.5 CLOUD SERVICE MODELS

Cloud computing is provided in different architectures. In the following section, different service models or architectures of the cloud receive classification.

2.5.1 Software as a service (SaaS)

Applications of an organisation can be run on the cloud, and thus "eliminating the need to install and run the application on the client computer" (Marston *et al*., 2011:178). SaaS helps organisations avoid capital expenditure and lets them focus on their core business instead of support services such as IT infrastructure management and software maintenance (ibid). Examples include Salesforce and Twitter.

2.5.2 Platform as a service (PaaS)

According to Marston *et al.*, (2011:178), "PaaS facilitates the development and deployment of applications without the cost and complexity of buying and managing the underlying hardware and software layers". It provides a platform for users to "build and run applications packages using a programming interface that is supported by the Cloud Service Provider" (ibid.). This according to Aleem and Sprott (2013:10), the customers will have "control over the installed applications", and can sometimes configure the hosting environment to meet their needs. Examples of PaaS include Google App Engine.

2.5.3 Infrastructure as a service (IaaS)

This service allows a company to use service provider's infrastructure. "It provides clients with access to server hardware, storage, bandwidth and other fundamental computing resources", (Choo, 2010:2). It is a Pay-As-You-Go platform and allows companies to access latest technology and only pay for what they use (Sahandi *et al*., 2013:4). The most cited examples include the Amazon EC2.

2.6 BENEFITS OF CLOUD COMPUTING TO SME IN DEVELOPING COUNTRIES

Cloud computing has opened a wide range of opportunities in developing countries. It has been touted as a panacea for small to medium enterprises (SMEs) to grow their businesses and reach out to the global market (Makena, 2014:517; Kapurubandara & Lawson, 2006:1).

Marston *et al*. (2011:178), in giving their point of view on the importance of the cloud to businesses identified SMEs as the major beneficiary of this computing paradigm. According to Marston *et al*. (2011:178), "the cloud provides the opportunity for new entrants amongst the SMEs in various business sectors to leapfrog, and compete with larger enterprises in the market." Makena (2013:517), also notes that if "SMEs have access to scalable technologies, they could potentially deliver products and services that, in the past, only large enterprises could deliver."

SMEs are affected by initially high investment costs, so cloud computing technologies enable SMEs to access IT infrastructure without need to buy servers, applications, and other related tools, but to only pay for the services they use (Makena, 2013:517; Choo, 2010:2). Kshetri (2010:50), claims that cloud computing allows businesses to lease storage and computational resources as needed, on demand. This helps businesses to overcome the small size disadvantages and improve the competitive nature of their businesses (Makena, 2013:517).

Cloud computing helps organisations to reduce capital expenditure in terms of upfront investments, where it is "cheaper to rent server space for a few hours than to maintain property servers" (Choo, 2010:2, Kshetri, 2010:50). Choo (2010:2) notes that cloud computing can help SMEs to use the most modern technologies, without being "responsible for operating and maintaining the technology."

Cloud computing technologies can help SMEs to evolve and develop cheap business models, where they have to pay only for operating costs, because upfront capital investments and other costs like maintenance costs are the responsibilities of the cloud provider (Mehta and Suriyanarayanan ,2013:7). Cloud computing allows for the efficient use of business resources, because the idea of a "pay as you use" model is highly

attractive option for SMEs, particularly in a turbulent global economic environment (Aleem and Sprott, 2013:8, Alshamaila *et al.,* 2013:251). Cloud computing "can lower IT barriers to innovation" by providing all applications on the Internet (Makena, 2013:517). Unlike traditional models of computing, cloud computing is independent of location, which means that company services can be accessed from anywhere, as long as there is access to the Internet (Yeboah-Boteang & Essandoh, 2014:14; Bayrak, 2013:5; Dwivedi & Mustafee, 2010:265). Company data can be accessed from anywhere in the world, without having to move around with computers loaded with company information stored on their hard drive (Sharma *et al.*, 2010a:146; Kshetri, 2010:53). This is also important as employees can telecommute, thereby helping to reduce carbon footprint.

Sharma *et al*. (2010a:144), note that the cloud makes it easier for businesses to be flexible and to scale their services up or down, depending on user requirements. Companies have different demands over time; therefore, their need for computing services also varies over time (ibid.). The scalability of computer resources depending on demand saves money, and reduces idle time (Carcary *et al.*, 2013:258; Yeboah-Boteang & Essandoh, 2014:14). According to Aleem and Sprott (2013:9), "the ability to increase data execution time is one of the main reasons organisations opt for use of the cloud."

With cloud computing, according to Bayrak, (2013:5), "SMEs and start-ups are able to deliver speed and agility, to update operations and to reduce time to market, as well as to improve customer engagement and success." The SME will therefore focus on core business, rather than on technology issues.

This removes the need for users to install, update or buy licences for new software and other applications (Sharma *et al.*, 2010a:2; Hutchings *et al*., 2013:2). Choo (2010:2), also highlights that businesses will not have worry about how to upgrade their resources whenever a new version has been availed on the market.

Whenever there are vulnerabilities in an IT system, the IT department has the responsibility to do patch management. This patch management has to be done quickly before saboteurs exploit the system. According to Aleem and Sprott (2013:9), patch management of an application can be very expensive to SMEs, and most of the cases usually take long to rectify the problems. Meanwhile, the SME may be closing the shop for number of days while trying to rectify the problem. Research shows that it takes SME

“approximately 20-60 days for deploying security patch”, (Aleem and Sprott, 2013:9). In such cases, cloud computing gains efficacy for the SMEs.

2.7 BARRIERS TO CLOUD COMPUTING

Cloud computing is a new computing paradigm and many people still have fears and doubts about the maturity of the technology (Sultan, 2011:273). These fears and uncertainties act as barriers to adoption of the cloud by SMEs. The following section highlights some of the barriers that affect ICT adoption in general, and cloud computing in particular.

The SMEs are usually small, both in terms of number of employees, and their technological sophistication, and hence, “firm size is one of the most important factors that determine”, whether an SME ought to adopt the cloud (Abdollahdehgan *et al.*, 2013:71; Low & Chen, 2011:1012). According to Kannabiran and Dharmalingam (2011:193), SMEs that have less than 10 employees were unlikely to adopt cloud computing than larger SMEs because there is less compelling need for advanced IT if they handle low volume of information in their daily business transactions.

“One of the most researched and the most commonly discussed issue about cloud computing is the security of the cloud”, (Kshetri, 2010:51; Choo, 2010:2). Security or vulnerability of information is a major concern to organisations that wish to adopt cloud computing. The loss of physical control of data is a cause for concern for many SMEs (Clear, 2007:14; Kannabiran & Dharmalingam, 2011:194). Security is one of the greatest impediments to cloud computing adoption (Misra, 2011:273; Kshetri, 2010:51; Kannabiran & Dharmalingam, 2011:194). According to Sultan (2011:273), IT departments and organisations are likely to be “wary of surrendering control of their resources to outside providers”, who might be able to tamper with the data without the consent of customers. According to Choo (2010:4), managers fear that their company data might be stolen in the cloud by competitors or saboteurs. To date, there are many cyber-spying and cyber-warfare incidences, which show the vulnerability of data stored in the cloud (Clear, 2007:2; Kshetri, 2010:54; Choo, 2010:4).

According to Misra (2011:273), research carried out by International Data Corporation reveals that “75% of respondents said they were worried about security.” This is also confirmed in a research by Aleem and Sprott (2013:2), in which 200 ICT professionals were interviewed worldwide. Respondents’ most cited concern was security, as reported by 93.4% of interviewees (ibid.). Security breaches in the cloud can cause disruption in business processes and may ultimately lead to loss of business (Durowoju *et al.*, 2011:243). “A classic example is the recent breach in Sony’s PlayStation Network (PSN), which resulted in unavailability of service for weeks, and cost the business billions of dollars”, (Durowoju *et al*., 2011:243).

There are different perspectives about the security of the cloud. Some believe the cloud is not secure, while others believe it is more secure than other types of computing. According to Misra (2011:273), “cloud computing can be as secure, if not more secure than what most organisations do today.” In the traditional IT environment, data may not be very secure because laptops and USB memory sticks may go missing. With the cloud there is no need to store data locally. Banham (2012), cited in Hutchings *et al*., (2013:3) claims that the cloud is very secure, because cloud service providers are always upgrading their security systems, as they are “more concerned about the consequences of reputational damage if data is breached.” Whatever the case may be, Schneir, (2008:3), observes that “security is both a feeling and a reality, and this means that cloud computing needs to appeal to the feelings” of users, and is required to address security risks to the satisfaction of users.

Trust and data lock-in are also important factors that act as barriers to cloud adoption (Buyya *et al.*, 2011:36). If cloud service provider goes bankrupt due to turbulent economic environment or any other reason, what guarantee is there to recoup data saved on their cloud? (Buyya *et al.*, 2011:595; Marston *et al.*, 2011:182). A case in point is the closure of cloud service provider Coghead in 2009, due to economic conditions, which resulted in months of retrieval time for organisations to recover their data (Aleem and Sprott, 2013:19). Another example is an incident in 2009, when Google Gmail went down for three hours, affecting 113 million users at once (ibid.). These incidents call for cloud services providers to be transparent and open to external auditing, as this may help build trust between providers and customers (Buyya *et al.*, 2011:595; Aleem, 2013:19). By agreeing to subscribe to cloud computing, the users agree to cede control

to the provider, and yet the terms and conditions by the provider do not show commitment to the safe-keeping of user data (Buyya *et al.*, 2011:595). For example, the Google App Engine Terms of Use require users to "agree that Google has no responsibility or liability for the deletion or failure to store any content and other communications maintained or transmitted through use of the service" (Google, 2013). Such clauses may scare away prospective business customers who may want to migrate to the cloud.

Communication "between different types of clouds from different vendors is often difficult to implement" and this raises the question of application portability (Chang *et al.*, 2013:529). Are programmes offered by different cloud providers portable, or will the customer simply be locked into a contract with one service provider (Lin and Chen 2012:534; Islam *et al*., 2013:160)? Madisha and Van Belle (2009:3) talk about limited customisation of the cloud to suit individual clients. Unless and until cloud service providers cater for every customer, no matter how small, people will continue to be sceptical about migrating to the cloud (ibid.). Lin and Chen (2012:534) point out that the "lack of standardisation of application programme interfaces and platform technologies means that the interoperability among platforms is poor", and so SMEs may find it difficult to transfer their data with ease from one cloud platform to another. This lack of standards again promotes customer lock-in (Buyya *et al.*, 2011:36). According to Mudge (2010:10), for cloud computing to be successful, the governments need to really work hard to promote open, international standards for the clouds to enable users to switch from one service provider to another with little or no cost and minimum risk.

To try to standardise services among cloud service providers, "the International Organisation Standardisation (ISO) technical committee for IT has formed a liaison subcommittee Distributed Application Platforms and Services (DAPS) for the standardisation of cloud computing" (Lin and Chen, 2012:534). This ensures that SMEs can move from one vendor platform to another with ease.

One of the cited barriers to cloud computing is the unavailability of in-house IT skills (Ismail *et al*., 2011:30). According to Kannabiran and Dharmalingam (2012:192), "SMEs generally lack human and technological resource needed for ICT and e-commerce, because they focus on day-to-day operations and lack time to understand the benefits of new technologies." Lack of IT knowledge in the organisation may hinder cloud computing

adoption (Ismail *et al.*, 2011:3). Kannabiran & Dharmalingam (2012:192) found that in small firms, ICT skills are barely sufficient and this is a big hindrance for SMEs to adopt emerging IT systems. The greatest barrier is aptly described by Carr (2005:71), when he says that "the greatest impediment to cloud computing will not be technological, but attitudinal." It goes without saying that the attitude of the managers and owners of SMEs towards a given technology has a great effect on their adoption of that technology. Meanwhile, most developing countries lack enabling infrastructure for their SMEs to adopt cloud computing and other emerging technologies (Kapurubandara& Lawson, 2006:5). According to Ismail *et al.* (2011:4), "the biggest problem in South Africa is expensive connectivity costs, coupled with lack of infrastructure, which supports emerging technologies." In most developing countries, there is a glaring disparity between rural and urban areas in terms of IT infrastructure (ibid.). Urban areas have necessary infrastructure to embrace emerging technologies whereas rural areas lack basic infrastructure such as telephone networks and electricity (Ismail et al., 2011:4; Misra and Mondal, 2011:507; Kapurubandara and Lawson, 2006:5; Ojukwu, 2006:53). Sharma *et al.* (2010b:204) have observed that in Ethiopia, telecom bandwidth is poor and Internet users can be disconnected for up to 10 days from the rest of world due to critical Internet failure. In Zimbabwe, power is not reliable, and hence, there is not enough power to sustain server farms. There is significant load-shedding that can go on for several hours, where during those hours, SMEs would be prevented from accessing their data. This is a serious barrier for SMEs to the adoption of cloud computing.

Kannabiran and Dharmalingam (2011:192) reveal that key factor that inhibits universal adoption and use of ICT by SMEs is the restrictively high cost of technology. IT investments are perceived by SMEs as expensive, and act as a barrier to adoption of cloud computing. Ndiege *et al*. (2012:3580), "observe that SMEs in developing economies have limited resources, and because of this, most of their capital is directed towards their core business functions."

Enabling environment in terms of regulations and laws pertaining to cloud computing is a positive driver to adoption of cloud computing. Marston *et al*. (2011:183) observe that the biggest factor likely to hinder the migration to cloud computing is the regulation at national and international level." The regulations range from transferability across political boundaries, to data storage and access (ibid.). In some countries, data about an

organisation cannot move in and out of the country without being scrutinised by the authorities, and such stringent regulations can “negate the benefits of cloud computing” (Marston *et al*., 2011:183). For example, The Golden Shield Project in China, “does not permit access of certain types of data” stored in another country, regardless of whether such data is obtained legally or illegally (ibid.).

According to (Khan *et al.,* 2011:205), governments, stakeholders and the private sector should prepare regulations, guidelines and policies that address cloud computing concerns “like security, interoperability, privacy, reliability, scalability, operator lock-in, Service Level Agreements (SLAs), regulating the cloud market”, and establishing some kind of a controlling authority to implement cloud policies and to monitor the performance of cloud providers. According to Kuyucu (2011:10), cloud computing policies should encourage and improve the cloud system, instead of crafting restrictive laws to control the clouds. In developing countries, “there is still a lack of effective and efficient cloud computing policy that would stimulate SME competitiveness and facilitate migration to cloud” (ibid.). This mismatch between policy design and actions scares away the SMEs and ultimately acts as a barrier.

2.8 FACTORS THAT ACCELERATE THE ADOPTION OF THE CLOUD BY THE SME

Makena (2013:517), observes that “before any organisation can use cloud computing, it must be aware of the existence of such a technology, what it is used for, and where it can be applied.” The following section will highlight some factors that drive SMEs to adopt cloud computing.

2.8.1 Access and availability of low cost computing DEVICES (LCACD)

The availability of cheap off the shelf computing devices can help SMEs to adopt cloud computing. Dwivedi and Mustafee (2010:265) observe that “LCACD is likely to play a central role in the adoption of cloud computing on the continent of Africa and in other developing countries like Brazil and India.”

2.8.2 Perceived benefits

Kannabiran and Dharmalingam (2011:189) describe perceived benefits as anticipated advantages, which will accrue to an organisation after adopting cloud computing. Apulu and Latham (2011) in Kannabiran and Dharmalingam (2011:189) observe that the competitive advantage and reduced cost and time are the important drivers to ICT adoption among SMEs in Nigeria. In his study, Sultan (2011:272) concludes that "the main drivers of cloud computing approach are economics and simplification of software delivery and operation." Some business owners are not very IT literate and if software package is easy to use, then organisations can be attracted to the package.

2.8.3 Size of IT Resource

According to Misra and Mondal (2011:506), the depth of resources currently present in a company play a big role in adopting cloud computing. They also observe that it may not be economically viable for companies with large data centres to "abandon their infrastructure and head towards the cloud." This means that SMEs, by virtue of their scale, should take full advantage and move to cloud computing, as they lack financial resources to invest in massive IT infrastructure.

2.8.4 Utilisation pattern of resources

Studies carried out on server utilisation show "that the global average server usage tops at 5% to 10% only", (Misra and Mondal, 2011:507). This indicates how uneconomical it can be to maintain underutilised servers. Cloud computing becomes more economical in such organisations, because they can only pay for what they have used.

2.8.5 IT experience of owner

The owner should be very much involved in stirring the business towards setting up sound IT goals, identifying the information needs of the business, and most importantly, allocating financial resources to the project. According to (Kannabiran and Dharmalingam, (2011:190) "IT knowledge, skills and practices are important determinants of whether IT is adopted or rejected by SMEs." Therefore, an owner's IT "knowledge and experience" can accelerate or decelerate IT adoption in the organisation (Makena, 2013: 519). IT knowledge and experience are to some extend affected by the level of education of the owner.

2.8.6 Amount of data handling and sensitivity of data

The amount of data generated by a company per day can be an important determinant of whether the company should migrate to the cloud or not. According to Misra and Mondal, (2011:509) “a huge amount of data acted upon would require a large bandwidth” and this would require a huge purse of money to “spend on bandwidth charges alone”, which would be an obstacle to the adoption of cloud computing in the long run.

2.8.7 Communication networks

Broadband communication network systems are very important for cloud adoption. In Zimbabwe, there are three main network service providers. Health competition among service providers can help create higher capacity, and higher-speed communication at lower cost, as the network providers continue to upgrade their infrastructure. Dwivedi and Mustafee (2010:678) advise that developing countries should “extend and increase capacity of their networks.” Migration to the cloud may also be accelerated by the availing open source software to SMEs.

2.8.8 Perceived Competitive pressure

Competitive pressure in an industry may cause an organisation to evolve over time, and become similar to other organisations (Kannabiran and Dharmalingam, 2011:191). Organisations may migrate to the cloud to maintain competitive advantage.

2.8.9 Globalisation

Globalisation is described as boarder-less commerce. Chang *et al.* (2013:526) define globalisation as closer integration of countries, trade and peoples of the world and dissolution of artificial barriers to allow the free flow of goods and services. Globalisation and liberalisation policies, according to (Kannabiran & Dharmalingam (2012:192), have made business resources more mobile and transferrable beyond borders. There are now less trade restrictions, and any company can reach any market in the world, provided they have the necessary technology. SMEs should migrate to the cloud to remain in business and to reach out and access an international market.

2.8.10 Network Readiness index

According to Dutta and Mia (2013:20), the “Networked Readiness Index (NRI) measures the preparedness of an economy to use ICT to boost competitiveness and well-being.” Countries that are ranked high have well developed IT infrastructure. The index also highlights potential obstacles that could slow the process to migrate to cloud computing. The index examines the environment in which “ICT is offered by a given country or community (Market, political and regulatory, infrastructure environment); the readiness of the community’s key stakeholders (individuals, businesses, and governments) to use ICT; and finally, the usage of ICT amongst these stakeholders”, (EIU, 2009:4). The higher a country is ranked, the better the SMEs are placed to adopt cloud computing.

2.9 THEORETICAL FRAMEWORKS

2.9.1 Assessing the readiness of an SME to migrate to the cloud*.*

An organisation can only migrate to the cloud when it is ready. An organisation’s readiness is not an overnight event; it is a process that involves the continuous improvement of ICT business processes. According to Makena (2013:518), the “SMEs’ readiness to adopt new technology is a determinant of how they will adopt various forms of technology” in cloud computing. Ram and Pattison (2009:8) define organisation readiness as “the ability of a firm to successfully adopt, use and benefit from information technologies.” The broad definition of e-readiness by Zaied *et al.*, (2007:77) includes the extent to which the community is prepared to participate in the networked world, which is gauged by assessing a community’s sophistication “in the areas that are most critical for ICT adoption and the most important applications of ICT.” E-readiness assessment is a way to try to gauge how ready an organisation in particular and the society or economy in general, are to benefit from the emerging technology. Assessment helps to gather information about the current state of affairs, in terms of technology infrastructure, and helps to develop an IT strategy that can help arm the organisation to improve in areas that are lacking. According to Nabavi and Davidrajuh (2009:175), “a high level of e-readiness allows enterprises to transact with business electronically in order to achieve a decrease in turn-around time, faster delivery of services, enhanced product choices etc.”

Khajeh-Hossein *et al.*, (2012:450), observe that "cloud adoption decisions are challenging, due to a range of practical and socio-political reasons." To make the job a little bit easier, researchers, organisations and academia have put forward many e-readiness assessment frameworks or models, which organisations can use to assess their readiness to migrate to the cloud. E-readiness assessment framework or model is an evaluation tool, purposed to measure the current state of ICT utilisation and ICT penetration levels of SMEs (Chanyagorn & Kungwannarongkun, 2011:99). According to Zaied *et al.*, (2007:78), "there are numerous existing e-readiness assessment models which vary in terms of objectives, methodologies and results." In the following section, some of these frameworks are briefly mentioned, and only one will be discussed in much detail.

Several frameworks or models have been put forward to assess the readiness of organisations to adopt cloud computing. Khajeh-Hussein *et al.* (2012:451) put forward Cloud Adoption Toolkit model; Tornatzky and Fleischer (1990) cited in Low and Chen (2011:1012) propose a TOE framework; Molla and Licker (2005) cited in Ogunyemi and Johnston (2012:3) propose a perceived organisational, environmental e-readiness (POER) model. Back in 1989, Davis proposed a theoretical technology adoption framework called Technology Acceptance (TAM) Model. According to Turner *et al.* (2010:463), "TAM is founded upon the hypothesis that technology acceptance and use can be explained in terms of a user's internal beliefs, attitudes and intentions." Some researchers have discredited TAM because it cannot "act as an accurate predictor of actual usage, but as a predictor of behavioural intention to use", (Turner *et al.*, 2010:463) These models work in different contextual environments, in which different organisations operate.

Ogunyemi and Johnston (2012:4) propose a relatively "new conceptual readiness framework of: national e-readiness; organisational preparedness; industrial relationships; internal resistance; and external influence" (NOIIE), which can be used to assess the readiness of organisations in developing countries to adopt new technologies like cloud computing.

From the above, it can be observed that there are many frameworks assess how ready the organisations are to migrate to the cloud. This introduces a new challenge to leadership in organisations as to which tool to select. Each tool has its own benefits and limitations. Dada (2006:3) observes that some tools or frameworks do not show how they

might be changed to suit the contextual environment in which the organisation is operating, “making them inflexible in their applicability in different contextual settings.” Dada (2006:3) observes that most frameworks “are fraught with uncertainties and ambiguities in both theory and practice, and assume a fixed, one-size-fit-all set of requirements.” This means that some frameworks do not take into account unique characteristics and contextual settings of organisations that are supposed to use them.

Based on the above challenges faced by organisations to select the best and most appropriate framework, this research is premised on NOIIE framework proposed by Ogunyemi and Johnston (2012) for two reasons. The first is that NOIIE was applied to assess readiness of organisations in South Africa, which is a developing country, where the framework can find resonance with organisations in Zimbabwe, which is also a developing country. The second reason is that NOIIE, according to Ogunyemi and Johnston (2012:5), “takes a positivistic stance that is governed by objectives, measureable outcomes and independence of the researcher.” This research also uses a positivistic strategy. The main shortcoming of the model could be that it is not yet mature, and has not been widely tested on SMEs in different settings.

2.9.2 NOIIE Readiness Framework

The flow diagram below shows NOIIE conceptual framework.

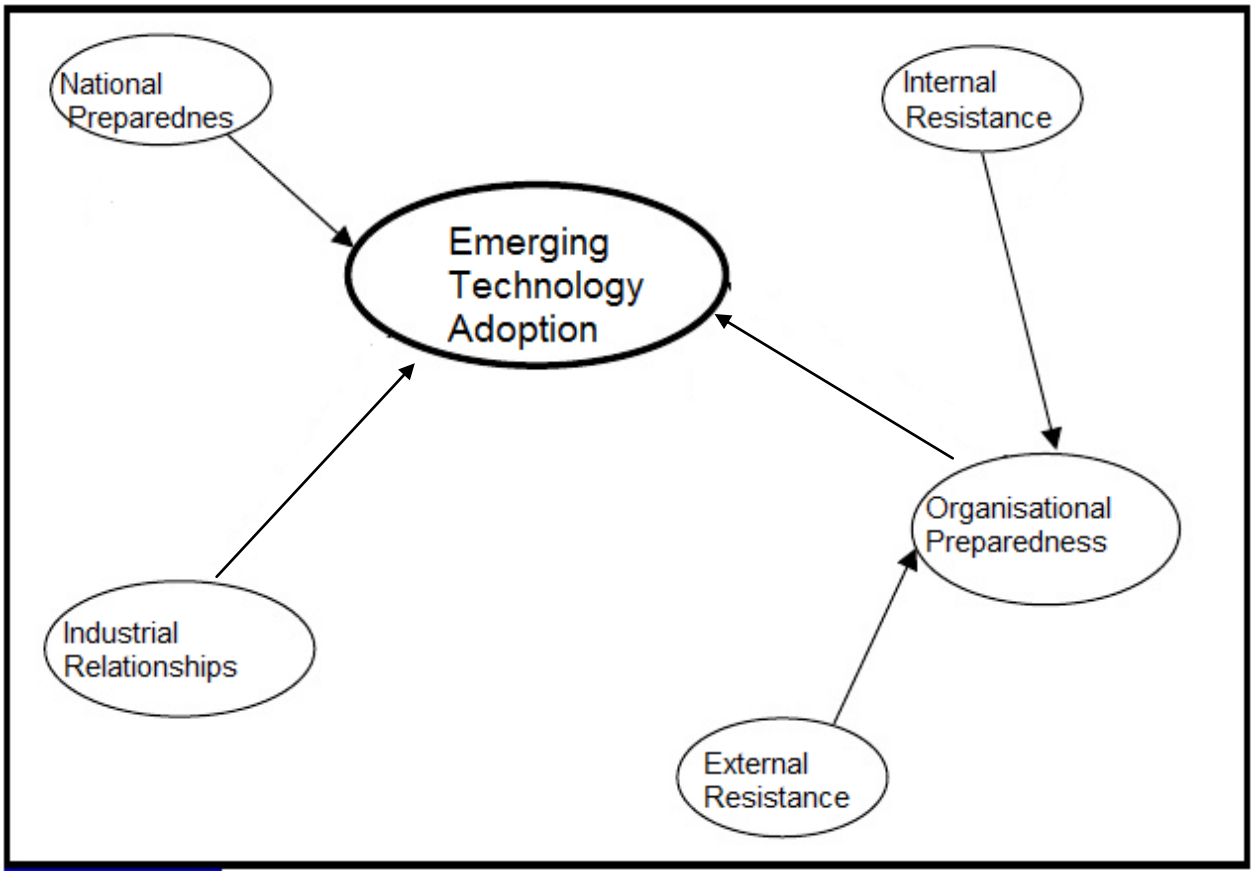

Figure 2.1 Conceptual NOIIE Readiness Framework: Adopted from Ogunyemi and Johnston, 2012

According to Ogunyemi and Johnston (2012:5), organisational readiness to adopt emerging technology is dependent on three broad factors: "

1. National e-readiness;
2. Industrial relationships; and
3. Organisational preparedness."

NOIIE framework point out that overall readiness of an organisation to adopt emerging technology "depends on an organisation's preparedness, where this is measured by people, governance and technology in the organisation" (Ogunyemi and Johnston (2012:5). Readiness can also be determined by the environment in which the SME conducts its business.

The following section explains how the three factors above can be used as a barometer to assess readiness of organisations to adopt an emerging technology like cloud computing.

2.9.2.1 National E-readiness

National readiness is essential to prepare necessary environment for organisations to operate. According to Dada (2006:1), “e-readiness as a measure of the degree to which a country, nation or economy may be ready or prepared to obtain benefits which arise from information and communication technologies (ICTs)”. A more holistic definition comes from Economic Intelligent Unit (EIU), (2009:2) which defines “e-readiness as a measure of the quality of a country’s information and communications technology (ICT) infrastructure and the ability of its consumers, businesses and governments to use ICT to their benefit”. The measurements gauge how ready a nation is to engage in electronic business. Kurnia *et al*. (2009:4) observe that for any country to realise the true potential of e-commerce (adoption of cloud computing), certain important measures must be taken to improve the core operational level of the country’s IT infrastructure.

The main inhibitors of successful technology adoption in developing countries like Zimbabwe, is “the under-developed core operational infrastructure” (Kurnia *et al*., 2009:4). According to Ogunyemi and Johnston (2012:5), the core operational infrastructure looks, among other factors, at the “Internet connectivity, business environment, legal environment, government policy and the people.”

According to Zaied *et al*. (2007:80), the criteria to assess the country’s e-readiness are as follows:

- Legal and regulatory environment for ICT use;
- Appropriateness of ICT;
- Affordability of ICT in the local context;
- ICT capacity and training;
- Availability of locally relevant content and services;
- Use of ICT in business;
- Integration of ICT into peoples’ lives;
- Physical access to ICT;

- Socio-cultural factors that affect ICT use;
- Security and peoples' trust in ICT;
- Macroeconomic environment affecting ICT use; and
- Government's role in driving e-readiness.

Korongo *et al.* (2013:6) advise that government should “set up the right regulatory framework to facilitate the uptake of cloud computing” by SMEs and that the framework should also look at the legal concerns of cloud provisioning to embrace Green IT. The government should craft frameworks that enable SMEs to sustainably and in innovative ways, become able to adopt cloud computing.

2.9.2.1.2 Internet connectivity

Mutula (2010:83) observes that “weak infrastructure and high cost keep connectivity rates for voice and Internet services depressed” in Africa. Internet connectivity entails the availability, reliability and affordability of Internet services. Bulawayo is well connected to more than three major Internet service providers. Affordability of these services ought to be a cause for concern to the government as it is to business at large. Mutula (201:82) concurs that the “cost of basic telephony and Internet connectivity remain disproportionately high across the (African) continent, with the vast majority of Africa’s population unable to pay for even basic access.” Zimbabwe does not lie outside this observation. According to Matshazi and Goka (2012:4), Econet (one of the service providers) charges US$98 for one gigabyte (1G) of data, while Telecel (another network service provider) charges US$48 for the same amount of data (as at August, 2014). In South Africa, MTN sells two gigabytes (2G) of data at R245, which is equivalent to US$27 (as at August, 2014). It becomes a challenge for SMEs in Zimbabwe to connect and use new technology, because the charges are disproportionately high. Availability of network access and pricing “are important determinants for the adoption of the cloud by SMEs”, (Yeboah-Boateng & Essandoh, 2014:17) in Bulawayo. Some researchers have mentioned bandwidth, Internet reliability and tele-density (Chandrasekaran & Kapoor, 2010:11) as important factors that determine the readiness of SMEs to adopt cloud computing.

2.9.2.1.3 Business environment

Business environment includes a basketful of factors. It is concerned with "external pressure from competitors, trading partners and the government on the" organisation, (Duan *et al*., 2012:3). Competitive pressure from other firms may force some organisations to adopt cloud computing for competitive advantage (Kurnia *et al*., 2009:4). Laws and regulations of a country that govern use of Internet can affect rate of adoption (Yeboah-Boateng & Essandoh, 2014:17). Political stability of a country may affect the rate of adoption of new technology. A stable political system with well-developed legal and IT regulatory system accelerates rate of technology adoption (Ogunyemi & Johnson, 2012:7). According to Low and Chen (2011:1013), trading partners may also positively influence an organisation to adopt new technology. Availability of IT skills and IT focused business vision can help an organisation to adopt new technology faster (Zaied *et al*., 2007:80). Assessment of business environment is important to making sure that it is conducive and receptive to new technology.

2.9.2.3 Organisational Preparedness

Fathian *et al*. (2008:8) defines organisational readiness as "the ability of a firm to successfully adopt, use and benefit from information technologies". Luftman and Kempaiah (2007) cited in Ogunyemi and Johnston (2012:7), posit that an "organisation's preparedness to adopt new technology to achieve competitive advantage is critical to its readiness." Some researchers have highlighted the "type of products and services offered, where human resources, size of firm, expertise and efficiency" as organisational factors that affect ICT adoption (Elbeltagi *et al*., 2013:25; Kurnia *et al.*, 2009:3). According to Alshamaila *et al*., (2013:253) and Kannabiran and Dharmalingam (2012:192), organisational size is viewed as one of the most important determinants of cloud computing adoption by SMEs. Small firms have potential to be more innovative, "where they are flexible enough to adapt their actions to the quick changes in their" environments, compared to big firms that have chains of bureaucratic levels, which can slow down decision-making process (Alshamaila, 2013:253; Oliveira & Martins, 2013:115). On the other hand, it is argued that "bigger-sized organisations typically have more flexibility in their resources, and therefore, can assign more organisational resources for the adoption of any new IT innovation", (Abdollahzadehgan *et al*., 2013:71; Duan *et al*., 2012:2).

Elbeltagi *el*. (2013:25) note that users' attitudes, power relationships and organisational structure are organisational factors that affect ICT adoption. Compatibility of the new technology with existing IT infrastructure positively affects its adoptability (ibid.). Governance, leadership and technology, according to (Ogunyemi and Johnston (2012:5), "all affect an organisation's preparedness to adopt new technology."

2.9.3.1 Governance

Governance describes the structure of an organisation and responsibilities of individuals in an organisation. Kurnia *et al*. (2009:3) observe that governance "encompasses strategic, tactical and operational model that defines the way organizations [sic] structure to establish objectives, allocate resources, and make decisions." Governance examines policies, guidelines, laws or other procedures that an organisation should abide by before migrating to the cloud (Beserra *et al*., 2012:2). Top management support is important for an organisation to adopt cloud computing. Top management should provide vision, commitment and adequate resources for adoption of cloud computing (Low and Chen, 2011:1012). The organisation should have a governance model to build a foundation for execution. Ross *et al.* (2006:4) define the foundation for execution as IT infrastructure and digitised process, automating a company's core capabilities. It becomes easier to migrate to the cloud when core processes are digitised.

Lalic and Marjonic (2011:104) observe that the leadership should view IT as a strategic transformation tool that they can use to get things done better, faster and more efficiently. Strong and visionary leadership should identify and resolve all constraints before migrating to cloud (ibid.).

Elbeltagi (20013:27) argues that, for an organisation to successful adopt e-commerce technologies, "the CEO must possess a reasonable working knowledge of the new technology." Utomo and Dodgson (2001) in Elbeltagi (2013:27) in their study of ICT adoption in Indonesian SMEs, found that top manager's level of IT knowledge, accompanied by a "favourable attitude towards IT, increases" the level of IT investment in an organisation. Support from top management is very crucial in SMEs to create a supportive climate and provide adequate resources in the adopting of the cloud computing (Duan *et al*., 2012:3). This is because in SMEs, owner-manager has full control of the organisation's financial and human resources, and hence, the support of

owner-manager is necessary for full adoption of a new technology. According to Alam and Noor (2009:115), a “skilled and knowledgeable workforce is closely linked with successful implementation of a new technology.”

2.9.3.2 Technology

Technological context describes both internal technologies available within an organisation and external technologies in the market (Yeboah-Boateng & Essandoh, 2014:13). The “adoption of modern technology is impacted by technological readiness of organisations, namely their technology infrastructure and human resources” in the field of IT (Abdollahzadehgan *et al*., 2014:72). Internet-ready organisations have technology infrastructure (network services, hardware and software) and skill competences in place to develop, scale and support these Internet initiatives (Lalic and Marjonic, 2011:106). Kapurubandara and Lawson (2006:4), found that the present level of technology usage in an organisation greatly affects the process of cloud adoption.

This means that an SME, with necessary infrastructure in place, can migrate faster to cloud computing without making major improvements in their IT infrastructure. According to Low and Chen (2011:1013), “technological infrastructure refers to installed network technologies and enterprise systems,” which can provide an enabling platform on which applications to support cloud computing can be built. Complexity in the new technology can act as a barrier to its implementation (Alshamaila *et al*., 2013:253). The new technology should be compatible with the SME’s existing values and needs (Low and Chen (2012:1012), because according to Alshamaila *et al*., (2013:253), “small business owners are concerned that the adopted innovation is not consistent with values and the technology needs” for the organisation. According to Sahandi *et al*., (2013:8), it is important to adopt cloud computing “within an overall IT strategy”, to provide a “real competitive advantage, improve business performance and control of IT resources for SMEs.”

Other technological factors that affect rate of technological adoption identified in literature include: reliability; cost; security and attitude towards technology (Elbeltagi *et al*., 2013:26). Studies by Premkunmar *et al.* (1997) and Drury & Farhood (1996) cited in Alam and Noor (2009:14) “found direct and significant relationship between cost and adoption of technology.” They concluded that when the cost of adoption is low, then the rate of adoption of the new technology by SMEs would be higher.

Caldeira and Ward (2002), cited in Elbeltagi (2013:26), identified the “availability of external expertise and quality of software available in the market and vendor support” as one of critical factors for the successful adoption of new technology. According to Ashamaila *et al.*, (2013:253), research has also shown that “when businesses perceive a relative advantage in an innovation”, they can probably increase the rate of adoption. Technological readiness is therefore one of the important factors for the adoption of cloud computing by SMEs.

2.9.4 Industrial Relationship

Kurnia *et al.,* (2009:4) and Ogunyemi and Johnston (2012:8) define industrial relationship “as a mutual continuous business relationship between a technology provider (vendor) and user (organisation), such that mutual benefits and cost effectiveness are achieved”. This section deals with “interactions between adopting SMEs and external institutions, their mutual dependencies and power relationships”, (Kurnia *et al*., 2009:4).

Technical support from a cloud provider is an important component of industrial relationship. However, studies carried out by Ogunyemi and Johnston (2012:8), show that “industrial relationships are insignificant to organisational readiness,” due to factors like “lack of awareness of the new technology, and enabling environment (National e-readiness).” Industrial relationship also looks at the fairness of service level agreements (SLA), as well as product availability and reliability (Yeboah-Boateng & Essandoh, 2014:14). The availability of standard is crucial for cloud computing adoption (Kurnia *et al*., 2009:4). According to Yeboah-Boateng & Essandoh, (2014:14), “lack of standards makes it difficult to integrate with other applications, or to switch between vendors, leading to vendor lock-in.”

Kurnia *et al*. (2009:4) note that successful e-commerce adoption requires a multi-sectorial approach in which “various sectors and segments of the industry work systematically through coordinating bodies to resolve their concerns and project their demands.” Some studies, for example, Ogunyemi and Johnson (2012:2) show that IT industries seem not to be providing the necessary required such as awareness of available products, cost of software affordability and flexible licensing to organisations.

2.9.5 Internal Resistance

Buyya et al. (2011:552) observe that “change can be challenging; it brings out the fear of having to deal with uncertainties”. Humans like other physical objects suffer from inertia, they resist to easily adapt to new situations. Lapointe and Rivard (2005), in Ogunyemi and Johnston (2012:9), define internal resistance as “the opposition to adoption of a technology due to negative impact of the technology on existing IT infrastructure.” Reasons for internal resistance range from perceived insecurity, perceived job losses (Ogunyemi & Johnston, 2012:8) or loss of authority (as technology takes over), to lack of skill, and all this to some extent can influence an organisation’s readiness to adopt a new technology. This then calls upon corporate leadership to aggressively articulate, through increased and sustained communication and education, reasons that change is critical and help workers to visualise and buy into the new vision (Buyya *et al.,* 2011:553).

2.9.6 External Influence

External environment refers to the environment in which the SME or organisation is operating. Kurnia *et al*., (2009:4) define external influence as “the pressure exerted on an organisation by peer organisations and business associates to adopt a new technology.”

A study by Alam and Noor (2009:115), concluded that “SMEs are often forced to use IT by large companies.” In one example of external influence to ICT adoption, the Dubai e-government initiative aimed at connecting all government offices and citizens compelled all organisations (businesses) wishing to do business with government to invest in technological platforms (Elbeltagi *et al.*, 2013:26). In yet another example, within Malaysian “shipping industry the shippers and forwarders were forced to transact with the Malaysian Customs Department electronically for duty payments and import/export declaration”, (Kurnia *et al*., 2009:5).

These examples show that, rather than making “a purely internally driven decision to adopt a new technology” (cloud computing), firms are sometimes forced to adopt and use technology by “external isomorphic pressure from competitors, trading partners, customers and government”, (Oliveira & Martins, 2011:116). External environment can, therefore, influence organisational preparedness to adopt a new technology.

2.10 SUMMARY

This chapter addressed the following research questions:

1. What are the benefits of cloud computing to SMEs?
2. What are the barriers that hinder SMEs from adopting cloud computing as a business strategy?
3. What are the factors that can affect the adoption of cloud computing by SMEs in Bulawayo?

The chapter highlighted the importance of SMEs to the economy of a country. Several definitions of cloud computing were given. The deployment and service models of cloud computing were briefly outlined. The chapter outlined benefits and barriers to adopting cloud computing. Factors affecting adoption of cloud computing by SMEs were outlined.

A literature review has shown that a lot of research has been carried out on benefits and barriers to adopt cloud computing by SMEs in developing countries. There is, however, a lack of literature assessing the readiness of SMEs in Zimbabwe in general, and in Bulawayo in particular, in the adoption of cloud computing. Developing countries are at different level of economic developments, where some are more advanced than others. It has been noted that research findings in one country therefore cannot simply be transferred to another country at a different level of economic development. The lack of literature in the area of ICT utilisation in general and cloud computing in particular creates a gap, and an opportunity for more research to be carried out to assess degree and readiness of utilisation of technology by SMEs in Zimbabwe.

The next chapter discusses research methodology.

CHAPTER 3:
RESEARCH DESIGN AND METHODOLOGY

3.1 INTRODUCTION

A chosen research methodology can make or break a research process. The previous chapter presented a review of literature. This chapter discusses the research process used in this dissertation. It highlights research design and philosophy, research method used to collect data, including sampling and questionnaire design. The chapter also outlines methods used to improve reliability and validity of data collected. Finally, the chapter concludes by looking at ethical issues. The research process was guided by the so-called 'research process onion' as devised by Saunders et al. (2009).

3.2 RESEARCH DESIGN

Research design refers to the "approach that a researcher wishes to adopt in order to answer the research questions" (Saunders et al., 2009:108). Many researchers and authors have come up with many definitions of research design, but many of them converge on one central theme of planning. Rowley (2002:18) views a research design as an action plan, starting from the research questions to conclusions. Kelinger (1986), cited in Kumar (2014:122) describes research design as a plan or structure, and strategy of investigation, conceived so as to obtain answers to research question or problem. Babbie and Mouton (2012:74) define a research design as a plan or blue-print of how a person might intend to conduct a research. A more comprehensive and all-encompassing definition is offered by Thyler (1993), cited in Kumar (2014:122), who defines research design as a blue-print or "detailed plan for how a research study is to be completed, operationalising variables so they can be measured, selecting a sample of interest to study, collecting data to be used for testing hypothesis, and analysis the results."

A research design helps to communicate to others how the researcher intends to carry out his or her research, how the data will be collected, how samples are chosen, and importantly, how the data are to be analysed (Babbie and Mouton, 2012:74). According to Kumar (2014:123), research design has two important functions, which are: 1) to

conceptualise an operational plan to undertake various procedures and tasks required to complete your study; and 2) to ensure that these procedures are adequate to obtain valid, objective and accurate answers to the research questions.

Research design is not an event, but a process, comprising the following perspectives: research strategy, data collection methods, data collection instruments or processes, data sources, timing of administering the data collection instrument, making a choice between quantitative, qualitative or possibly both approaches. The research design should be clear, structured and unambiguous.

Saunders et al. (2009:108) use the 'research onion' to organise the research design.

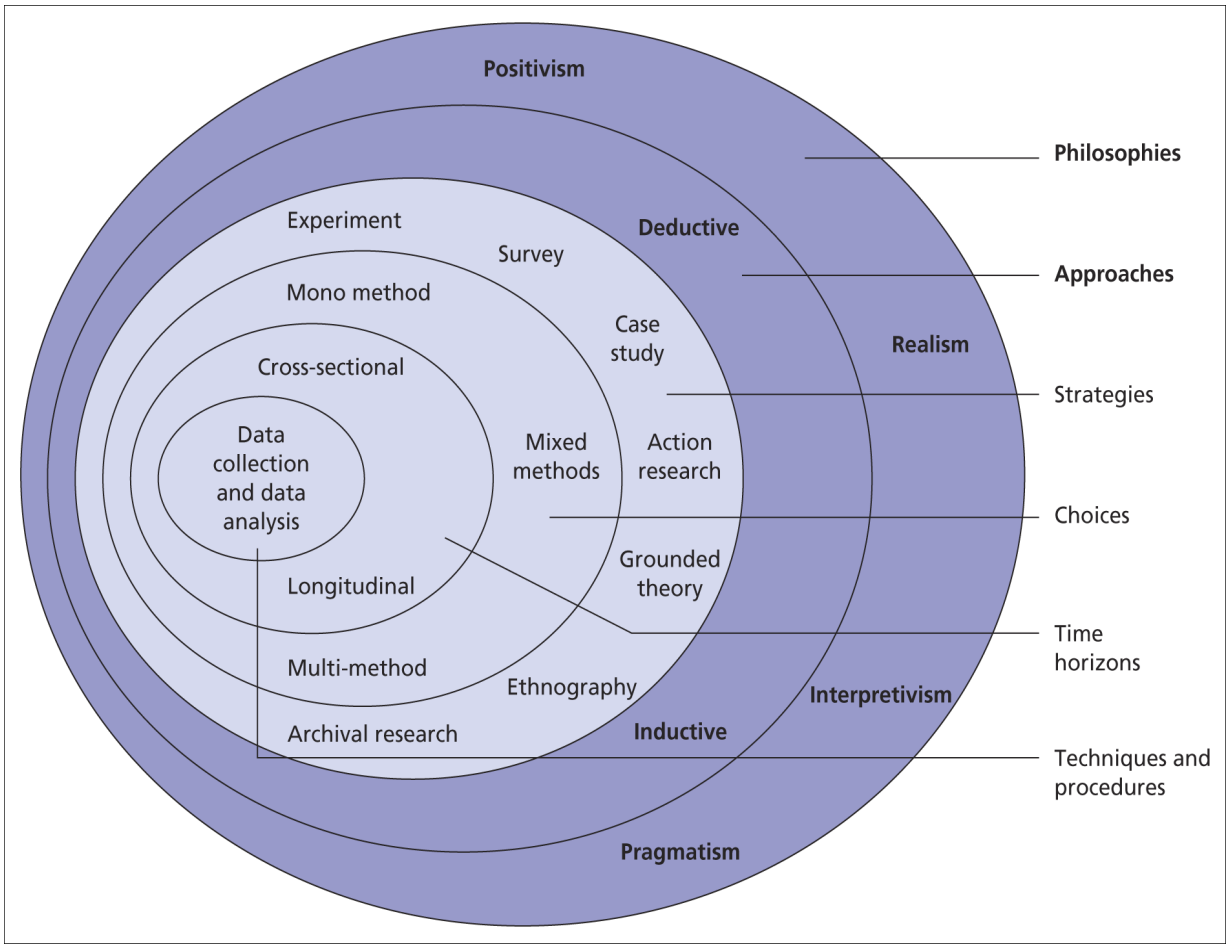

Figure 3.1: Research onion adapted from Saunders et al., 2009:108.

The research onion depicts the issues under investigation in the research process. It shows the steps and guidance as to how research ought to be conducted. The onion research process entails 'peeling off' various layers of until reaching the 'core'. Each

layer represents a research process. The following section highlights the research process according to Sanders *et al*. (2009:106).

3.3 RESEARCH PHILOSOPHY

A research philosophy is also known as a philosophical paradigm. According to Bryman (1988), cited in Matthews and Ross (2010:34), “a paradigm is a cluster of beliefs and dictates, which for scientists in a particular discipline, influence what should be studied, how research should be done, how results should be interpreted and so on”. Oates (2006:282) observes that there are different philosophical paradigms, which have “different views about the nature of our world (ontology) and the ways we acquire knowledge about it (epistemology).” This means that research paradigms contain certain assumptions about how the researcher views the world, and as such, these assumptions will reflect the research strategy and methods used. The paradigm chosen for a particular research is informed by the purpose and the type of research questions.

According to Sanders *et al.* (2009:108), there are four main research paradigms, namely: positivism, interpretism, realism and pragmatism. The following section briefly describes the four research paradigms in succession.

3.3.1 POSITIVIST PHILOSOPHY

Oates (2006:286) observes that one of the assumptions of positivism is that the world exists independently of human meaning, where it is assumed that there is a physical and social world that exists ‘out there’, not just in our minds, to be studied, captured and measured. This physical and social world show some order and researchers can objectively study it. The researcher is independent of and neither affects nor is affected by subjects of the research (Saunders *et al.*, 2009:114). According to Saunders *et al.* (2009:113), “positivist researchers prefer working with observable social reality, where the end product of such research can be law-like generalisations, similar to those produced by physical and natural scientists.”

3.3.2 REALIST PHILOSOPHY

The underpinning position of this philosophy is that reality exists out there and is quite independent of the mind", (Saunders *et al*., 2009:114) and social phenomena "are based on both what can be observed and recorded, where 'hidden' structures and mechanisms effects can be observed", (Matthews and Ross, 2010:29). Two types of realism are identified, namely direct and critical realism. Saunders *et al.* (2009:114) differentiate direct and critical realism. Direct realism is what we get through our senses. Direct realists assert that our knowledge of reality is a product of social conditioning, and assumes that 'what you see is what you get', i.e., that what "we experience through our senses portrays the world accurately." Critical realists dispute that assertion and argue that what we experience are sensations, they are images of the things in the real world, not the things directly (Saunders *et al.* 2009:114).

3.3.3 INTERPRETIVISM

This paradigm focuses on the interpretation of meaning. The researcher derives knowledge from daily encounters with concepts and meanings. According to Matthews and Ross (2010:29), "from these daily encounters, the researcher decodes the meanings into accepted social scientific language." Saunders *et al.* (2009:119) reason that the researcher has to "adopt an empathetic stance" in order to get as much meaning as possible. From the gathered data, the researcher can then formulate a theory.

3.3.4 PRAGMATISM

The paradigm focuses on practical, applied research, integrating different perspectives (Saunders *et al.*, 2009:119) to interpret data. This paradigm allows the researcher to adopt a mixed-method approach.

3.4 RESEARCH PHILOSOPHY APPLIED TO THIS RESEARCH

This research applied a positivist paradigm. The research findings by Mkansi and Acheampong (2012:134) report that positivism philosophy was more popular and widely applied in information systems. “Positivism follows a scientific method to produce knowledge that is empirically tested and unbiased, but truly objective, rather than knowledge based on belief or faith.” A positivist approach usually represents findings quantitatively in numerical forms, and the researcher just comments on the social realities of how many SMEs are ready or not ready to migrate to cloud computing, because the numbers speak for themselves. Using a positivism paradigm, assessment of readiness of SMEs to adopt cloud computing was objectively carried out by using questionnaires.

3.5 RESEARCH APPROACH

The research approach determines how the research is conducted, that is, whether it starts from a more general point of view, to a more specific standpoint, or vice versa. Research approach is important, Easterby *et al*., cited in Saunders *et al*. (2009:123), observe that research approach helps researcher to make informed decisions about their research design. Two of the main research approaches are deductive and inductive.

3.5.1 DEDUCTIVE REASONING

“Deductive reasoning begins its focus on a general, holistic understanding of the theory, and then abstracts to a specific subject of focus,” (Trochim & Donnelly, 2007:100, Wills, 2007: 213). Saunders *et al*. (2009:124) observe that deductive reasoning “involves the development of a theory that is subjected to a rigorous test.”

3.5.2 INDUCTIVE REASONING

According to Wills (2007:213), inductive reasoning begins its focus from a “specific view, and works towards a more general and conceptual understanding of theory”, referred to as a ‘bottom up’ approach. It makes specific observations, first to formulate a hypothesis, which then leads to a theory. Saunders *et al.* (2009:124) put forward that one of the

advantages of inductive reasoning is that it is a flexible approach, which allows alternative approaches.

The following table highlights differences between deductive reasoning and inductive reasoning.

Table 3.1: Differences between Deductive and Inductive reasoning

Deductive Reasoning	**Inductive Reasoning**
Scientific principles	
Moving from theory to data	Gaining an understanding of the meanings humans attach to events
Need to explain causal relationships between variables	Close understanding of the research context
Collection of quantitative data	Collection of qualitative data
Application of controls to ensure validity of data	Flexible structure to allow changes of research emphasis as the research progresses
Concepts are well defined to ensure clarity	
Highly structured approach	
The researcher is independent of what is being researched	Acknowledges that the researcher is part of the research process
Necessary to choose samples of sufficient size in order to generalise conclusions	Less concern with the need to generalise

Adapted from Saunders *et al*., 2009:127.

The research adopted deductive reasoning as a research approach. The use of survey questionnaires allowed collection of quantitative data which can be used to generalise findings from a sample (Saunders *et al.*, 2009:124). This goes hand in glove with this research, because it used a survey strategy in which data were collected from a sample and the findings would then be generalised to apply to all SMEs in Bulawayo.

The research first concentrated on collecting literature findings on SMEs and their readiness to adopt cloud computing. The next step was to clearly define the research questions to be addressed. The third step, according to deductive reasoning, was to conduct “observations”. Thus, questionnaires were distributed to the sampled SMEs to gather data. The final step involved analysing the findings collected from the research participants to confirm or refute the findings in literature view, that is, the theory of readiness of SMEs in Bulawayo to adopt cloud computing as a business strategy.

3.6 RESEARCH STRATEGY

Saunders *et al.* (2009:108) research onion highlights seven research strategies a researcher can use, namely: archival research, ethnography, grounded theory, a case study, action research, an experiment and a survey.

The nature of research questions determines research strategy. Guided by this assumption, this research used a survey strategy. The strategy was chosen because of its relevance to the deductive approach of this research. The study covered many SMEs, spread over a large geographically dispersed location. The survey was the best strategy to use to involve as many SMEs as possible to participate in the study. With this strategy, a researcher can get same information from several units in the sample at the same time. Supporting the same point, Oates (2006:93) observes that when it comes to surveys, “the same kind of data can be obtained from a large group of people (or events) in a standardised and systematic way.” Survey strategy is probably “the best method available to social scientist interested in collecting original data for describing a population too large to observe directly”, (Babbie and Mouton, 2012:232).

The purpose of a survey strategy, according to Creswell (2003:154), “is to generalise from a sample to a population so that inferences can be made about some characteristics, attitude, or behaviour of this population.” With surveys one can produce lots of data in a short period time and cheaper. (Creswell, 2003:154). Surveys are less expensive in terms of both time and costs of the researcher. Saunders et al. (2009:144) observe that with surveys, “it is possible to generate findings that are representative of the whole population at a lower cost than collecting the data for the whole population.”

With surveys it is also easy to plan and manage research project since the researcher knows what he or she wants ahead of time.

Surveys, by means of questionnaires, ask exactly the same questions to every unit in the sample, hence treats all units in the same manner, without being biased (Babbie & Mouton, 2012:263) or overwhelmed by what the researcher experiences at any SME.

3.6.1 Advantages of a survey

1. It produces quantifiable and reliable data that are usually generalisable to a larger population. It means, therefore, that data generated from studying SMEs in Bulawayo can be generalised to the whole country.
2. If carried out properly, "the research can be replicated, that is, the same data can be collected again from another sample in another part of a country" (Oates, 2006:104).
3. "Surveys can produce a lot of data in a short time at a reasonable low cost" (Oates, 2006:104). A researcher can send many questionnaires to the targeted sample of SMEs and retrieves them for analysis.
4. "The researcher knows in advance what he or she is looking for", (Leedy *et al.* 2005:25) and hence, all aspects of the study are carefully designed before data are collected.
5. Where relevant, surveys using questionnaires are suited for researchers who do not have good communication skills.

3.6.2 Disadvantages of survey

1. A survey lacks depth and "does not provide much detail on research topic"; instead the focus is on breadth of coverage (Oates, 2006:105). The researcher was concerned with size of sample, whether it was wide enough to be generalised to the whole population.

2. The significance of the data can become compromised if the researcher focuses too much on the range of coverage to the exclusion of an adequate account of the implications of those data collected in terms of solving issues, problems, or formulation of theories. The researcher was obliged to select a properly constituted sample and was not worried about the wide geographical coverage.
3. A survey is rigid to new discoveries made during data collection process.

4. A survey tends to concentrate on what can be counted and measured, and that which can be subjected to statistical analysis, and ignores qualitative analysis as to why some SMEs are ready or not ready to adopt cloud computing.
5. There were many SMEs under investigation, and hence, it was not possible to know in detail each and every SME.

3.7 RESEARCH CHOICES

Choices refer to research method the researcher employed in the research. According to Saunders *et al*. (2014:151), choices refer to research method of choice to conduct a study, quantitative, qualitative or mixed-method. The following section briefly explains the different choices available as espoused by to Saunders *et al.* (2009:152).

3.7.1 Mono method

This means using a single technique to collect data and one data analysis procedure to answer a research question. The researcher may use a single questionnaire as a data collection method, and a single quantitative analysis procedure or may use in-depth interview and a qualitative data analysis procedure (Saunders *et al*., 2009:152).

Multi-methods are divided into multi-method and mixed method.

3.7.2 Multi-method

This is a method associated with quantitative or qualitative methods. With multi-quantitative study, the researcher may choose to use quantitative method and then uses both questionnaires and structured interviews to collect data and then use statistical procedures for data analysis (Saunders *et al*., 2009:152).

3.7.3 Multiple mixed methods

The mixed methods are classified as mixed method research and mixed model research.

3.7.3.1 Mixed method approach

The researcher uses both quantitative and qualitative methods to collect data and for data analysis at the same time.

3.7.3.2 Mixed-model research

With this method, the researcher uses both quantitative and qualitative simultaneous. According to Saunders *et al*. (2009:153), one may take quantitative data and "qualitise it", or "quantitise" qualitative data.

3.8 METHOD USED FOR THE RESEARCH

This research adopted a multi-method quantitative study. The research used both the questionnaires and observation to collect data. SPSS statistical package was used to analyse data. This was basically chosen to improve validity and for data triangulation.

Maree (2010:145) defines quantitative method, "as a process that is systematic and objective in its ways of using numerical data from only a selected subgroup of a universe (population) to generalise the findings to the universe being studied." Quantitative research methods produce statistics through the use of survey research which uses structured interviews and questionnaires (Dawson, 2006:15).

Data were collected through questionnaires and observation. The questionnaire was aligned to NOIIE framework, which includes: "national e-readiness, organisational preparedness, and industrial relationship, internal resistance and external environment" (Ogunyemi and Johnson, 2012:8).

3.8.1 Strengths of the Quantitative method

- Replicability: the questionnaire can be made public and this allows the findings to be scrutinised.
- Results of the findings can be summed up and can used to compare the trend across population groups.
- The dataset can be transferred to other analysts and this therefore, "means that analysis is not dependent on availability of the researcher", (Dawson, 2006:15).
- The testing of reliability and validity is done more objectively than qualitative techniques.
- The hypotheses and variables are selected before the commencement of the study and hence remain fixed throughout the study. This helps the researcher to remain fixed and focused throughout the study (Creswell (2003:56).

However, the quantitative method has the following weaknesses:

- The major disadvantage is that it is too rigid, one cannot change despite new evidence during the course of study.
- Quantitative data need to be processed and analysed to offer meaning to the reader.

3.9 TIME HORIZON

Cross-sectional horizon was used in this study because in quantitative research, cross-sectional design tends to predominate (Saunders *et al.*, 2009:155). In cross-sectional study, data is collected only once after distribution of questionnaires. Cross-sectional study was used because it is the "least costly in terms of both time and money", because data are collected once (Vogt *et al.,* 2012:24).

3.10 SAMPLING

Sampling is the process of selecting a small part from a "whole population for study" (Oates, 2006: 95, Maree, 2010:79). There are many things to take into account when sampling. "These include identifying the sampling frame (potential sample); sampling method (probability and non-probability); and sampling techniques, to select the actual sample and sample size", (Maree, 2010:79).

3.10.1 Target population

The target population consists of all units relevant to the research question (Maree, 2010:145, Cox, 2008:4). Welman *et al.* (2008:126) define target population as a population to which researcher would like to generalise his or her results. The target population for this research was all decision makers in different SMEs in Bulawayo, that is, managers, owners and chief executive officers of SMEs. These individuals are well placed to be able to chart and articulate company vision in terms of usage of any technology. The study also targeted those SMEs with one employee and up to 300 employees.

3.10.2 Sampling frame

A sampling frame is defined as “a complete list of all the cases in the population from which your sample will be drawn”, (Saunders *et al.*, 2009:214). Babbie and Mouton (2012:184) define sampling frame as a “list or quasi-list of elements from which a probability sample is selected.” Sampling frame is the whole population from which a sample is chosen. This research used a list of all registered SMEs in Bulawayo as the sampling frame. The list was obtained from Bulawayo Association of SMEs.

3.10.3 Sampling technique

A sampling technique deals with how exactly a researcher will select the actual people or events from the sampling frame (Oates, 2006:96). The researcher used probability sampling, because the survey was intended to generalise the findings, where the sample size was assumed to be significantly representative of SMEs in Bulawayo. Probability sampling means that the researcher chose a sample with “full belief that there was a high probability that the sample chosen was representative of overall population studied” (Oates, 2006:96).

There are 240 SMEs registered with Bulawayo Association of SMEs. The list was obtained from the offices of the organisation. From a pilot study, SMEs which have been in operation for three months or less were removed from the list. After that, the list was reduced to 180. These SMEs are involved in diverse areas of business. The SMEs on the list are arranged according to date of registration. Each SME can be identified by its physical address. Due to budget and time constraints, 60 SMEs were sampled. The researcher used systematic sampling. With systematic sampling, one can select every “nth” SME from the list of all registered SMEs (Vogt *et al.*, 2012:124).

The following procedure was used to identify which SMES to sample from the list.
The number of SMEs on the list was 180, and the desired sample was sixty. Dividing 60 by 180, a fraction $\frac{1}{3}$ (one third) was obtained. This means that every third SME on the list was selected. To avoid sampling bias, a computer was used to randomly generate number between one and three. The output from the generation was two. This meant

that the first SME to be selected was at position two, and thereafter every third SME was sampled until the desired sample of 60 was achieved.

3.10.4 Advantages of systematic sampling

According to Vogt *et al.*, (2012:124), when systematic is done correctly, it will approximate the results of simple random sampling. It ought to be stressed that "in systematic sampling, the selection of a sample is very convenient and is cost and time efficient. This is an aspect of systematic sampling which makes it applicable in many situations" (Bajpai, 2010:266).

However, the systematic sampling method has also some disadvantages as well. For example, if periodicity exists, it makes the sample to be biased (Baijpai, 2010:266). The researcher carefully studied the list of SMEs to ascertain the presence of periodicity, and none was noted. Otherwise, the researcher was prepared to divide the desired sample into two lists. Different intervals and starting points for each list would be randomly selected, and thereafter combine the samples to form a study sample.

3.10.5 Sample size

According to Black, (2010:122), "researchers seek sample sizes, which yield findings with at least a 95% confidence" interval, where 95 times in100 would result in the same response. The researcher used a sample size of 60 SMEs and to yield statistically interesting results that can be generalised to all SMEs in Bulawayo. The budget and time constraints allowed for only 60 SMEs to be sampled.

3.11 DATA COLLECTION

The type of research design determines type of data collecting method. Welman, (2008:127) advises that "before choosing a data collection method, it is necessary to understand the type of data that need to be collected." This is quantitative research, and hence, the researcher used self-administered questionnaires and observation to collect data. "A questionnaire is a pre-defined set of questions, assembled in a pre-determined order" (Oates, 2006:219) to which respondents answer questions to provide the

researcher with data. “Questionnaires and interviews are widely used data collection methods in information systems research” (Oates, 2006:116).

3.11.1 Advantages of Questionnaires

1. They generate large amounts of data at low costs of materials and time.
2. They eliminate the variation in questioning that can occur when a number of different interviewers are used, thus increasing reliability and reducing bias inherent in interviews (Oates, 2006:230, Babbie & Mouton, 2012:266).
3. “The use of closed questions in questionnaires makes it easy for respondents to complete and hence becomes easy for researchers to analyse”, (Babbie & Mouton, 2012:266).
4. Babbie and Mouton (2012:266) observe that advantages of self-administration questionnaires are speed, economy, possibility of anonymity and privacy to encourage candid responses.

Observation was also used to gather data from SMEs. The use of more than one method to collect data is important for triangulation. Triangulation in research is important to enhance confidence in the findings or results.

3.12 DESIGNING THE QUESTIONNAIRE

Questionnaires were distributed to managers, supervisors and owners of SMEs in Bulawayo. These individuals are responsible for stirring the direction the organisation takes. The questionnaire was designed in line with the NOIIE framework to collect two sets of data in the survey; that is, data not directly related to the study like demographic information, and data that was directly related to the study (Oates, 2006:116). Some researchers like Fowler (2014:105) recommend that “self-administered questionnaires should be restricted to closed answers, because when respondents are asked to answer in their own words, the answers are usually incomplete, vague, and difficult to code.” Based on this recommendation, the questionnaire sent to respondents contained mainly closed questions, which are easy to code.

3.12.1 Lay-out of the questionnaire

The questionnaire was laid out attractively “to encourage the respondents to fill it in and return it” (Saunders *et al*., 2009:387). The questionnaire was simple in both visual

appearance and wording, as per the recommendations of Dillman (2007) cited in Saunders *et al.* (2009:382).

The first part of the questionnaire comprised an introductory letter explaining the reasons why the research was undertaken. In the letter, the researcher pledged to keep responses confidential. The body of the questionnaire was made up of five sections, viz. Section A to Section E. Section A asked demographical information and generated a business profile. Section B tested respondents on their knowledge on cloud computing. A five-point Likert scale was used for each question, in which a list of statements was provided for people to answer by showing the extent to which they agreed or disagreed with a statement. Section C asked respondents to identify barriers they faced to adopt cloud computing as a business strategy. Section D asked respondents to identify challenges they faced to migrate to cloud computing. Section E consisted of NOIIE model questions, which asked respondents about their readiness to migrate to cloud computing.

Table 3.2: Questionnaire composition

Concept: **Readiness areas (NOIIE)**	**Description of each concept**	**Question Number(s)**
National E-Readiness	• "Internet connectivity • Legal environment • Business environment • Government policy and Vision • Consumer and business Adoption"	**Section E:** 16 o, q, r, s, u v, w, x, y
Organisational Preparedness	• "Governance • Technology • Product awareness"	**Section E:** 1,2,3,4,5,6,7,8,9,10,11,12, 13, 14, 15 16a, b, c, d, h, j, k, j, m, n

Industrial Relationships	• "Product availability • Service level supports • Product license • Drive for competitiveness"	**Section E:** 16i, n, t, x, z, aa, bb, cc
Internal Resistance	• IT staff • Application owners • Top executives	16e, f, g, h, cc, bb
External Influence	• Peer organisations • Business associates	16i, p, q

(Adapted from NOIIE model from Ogunyemi and Johnson, 2012:10).

3.12.2 Questionnaire pilot study

A pilot study, which is a situation in which a questionnaire is tested (Fink, 2013:7), was conducted. Its purpose was to measure the usability and reduce any ambiguity and identify and prune any errors on the questionnaire before the main survey (Fink, 2013:7). Edwards and Talbot (1999:37) recommend that a "pilot study should not include people or settings from the main study". This, however, is contrasted with Fowler (2013:8), who recommends that you should try to duplicate the environment in which the survey is to take place.

The questionnaire went through certain adjustments, as per the recommendations of the supervisor. The questionnaire was also sent to six Master's (computing) students, and three SME owners, in order to evaluate and provide the following information, according to Bell (2010:151):

• how long did it take you to complete?
• were the instructions clear?
• were any of the questions unclear or ambiguous? If so, will you say which and why?
• did you object to answering any of the questions?
• in your opinion, has any major topic been omitted?
• was the layout of the questionnaire clear/attractive?
• do you have any additional comments?

The questionnaire was then adjusted in accordance with the positive recommendations from the pilot study.

The respondents were given two weeks to complete the questionnaires. After questionnaires had been distributed, a follow up plan was designed to remind the respondents about the due-date to complete questionnaires. This was done seven days after questionnaires were distributed. There were extra blank questionnaires to replace those that were misplaced. All this was done to increase response rate, because SMEs are known to "produce unsatisfying response rates" (Rasmussen & Thimm, 2009:85). This comment comes from findings by Rasmussen and Thimm (2009) when they carried out a research on SMEs with the intention of describing SMEs and their use of IT.

3.13 DATA ANALYSIS

Data is the raw material of research, which must be transformed to information to be intelligible and offer meaning to stakeholders. Mayan (2001:21) defines data analysis as "...the process of observing patterns in the data, asking questions of those patterns, constructing conjures, deliberately collecting data from specifically selected individuals on targeted topics, confirming or refuting those conjures [...]." Yin (1994), cited in Vargas-Hernandez *et al*. (2011:48), observes that data analysis "consists of examining, categorising, tabulation, or otherwise recombining the evidence to address the initial propositions of a study." Data analysis reduces data into intelligible and interpretable form, which can help to draw conclusions. Neuman (2000:426) describes data analysis as "a search for patterns in data: recurrent behaviours, objects or body of knowledge." The definitions help to highlight the importance of data analysis. The whole purpose of research is to educate and inform the stakeholders about the readiness of SMEs in Bulawayo, in order to adopt cloud computing as a business strategy, such that data analysis should decipher the hidden meaning to inform the stakeholders.

In survey research, both descriptive and content statistics are used for data analysis (Edwards and Talbot 1999:115). After collecting all questionnaires, the researcher cleaned, coded, organised and analysed quantitatively. The data were transformed into standardised numerical codes for easy retrieval and manipulation by a machine (Babbie

and Mouton, 2012:418). After that, the data were handed over to a private statistician, who entered data into SPSS for analysis by producing frequencies, percentages, pie charts and bar graphs. The researcher was also heavily involved during the process of analysis to make sure that no errors would be introduced at this stage of study.

3.14 VALIDITY AND RELIABILITY

Maree (2010:147) defines reliability as "consistency or repeatability of a measure of an instrument." If a measure or an instrument produces repeatedly consistent results on the same sample, it is described as being highly reliable.

Validity, according to Leedy *et al.* (2005:25) is the extent to which the instrument measures what it is supposed to measure. It is concerned with accuracy and credibility of the whole project. Validity can be verified through internal and external validity. Blanche and Durrheim, 2004 in Maree (2010:39) describe internal validity as the extent to which causal conclusions can be drawn, and external validity as the applicability of the results and research findings to a wider environment, or their generalisability to other situations.

The difference between reliability and validity is that reliability refers to the repeatability of findings while validity refers to the credibility or believability of the research results (Leedy *et al.* (2005:25; Maree, 2010:39). The researcher was aware of factors that could threaten reliability and validity and tried to minimise these to optimise credibility. Internal validity is threatened by such factors as unreliable instrument used during the research or the loss of respondents during research (attrition) (Maree 2010:39). These factors can influence results of a research. External validity can be threatened by selecting a sample size that is not representative enough to allow results to be generalised to the wider population.

3.14.1 Addressing issues of validity and reliability in the research

- Research data was collected from people (managers, supervisors and owners of SMEs) best-suited to providing information not just any person from the SMEs under study.

- Data collecting instrument, the questionnaire was pretested during pilot study to minimise flows in the design and increase integrity of the survey.

- The researcher followed strict procedures during the designing process and careful development of the questionnaire. This included question wording and question format because they can influence the quality of data collected (Babbie and Mouton, 2012:265). Each section of the questionnaire had instructions to help the respondent to answer correctly.

- The questionnaire was carefully designed and was made slightly longer to improve reliability and to cover great aspects of assessing the readiness of SMEs in Bulawayo to migrate to cloud computing. At the same time, the questionnaire was well laid out to minimise boredom and fatigue on the side of the respondent.

- The questions on the questionnaire were adopted and sourced from the NOIIE model, and were deemed suitable to measure the construct of readiness of SMEs to adopt cloud computing as a business strategy.

- The researcher obtained information from all sampled SMEs population; this was done to avoid implementation of procedures to compensate for non-responses from the sample.

- When coding and capturing data from survey forms, the researcher made sure that this was done meticulously by a professional statistician.

3.15 ETHICS

Saunders et al. have stated that “ethics refers to the appropriateness of your behaviour in relation to the rights of those who become subject of your work, or affected by it” (2009:183). Ethical issues refer to rights of people who will be the respondents in the survey. They are concerned with honesty and fairness on the part of the researcher. The researcher did the following to treat ethical issues:

- informed respondents of the right to withdraw in the middle of the research;
- assured the respondents of confidentiality and anonymity on their responses and that no one would be able to identify who the respondent was, and hence no identity particulars were needed on the questionnaire;
- avoided coercion of potential respondents to participate in the study;
- informed respondents of the right to participate or not;

- informed the participants about the purpose of research, and that there were no economic benefits that were going to accrue, either to the researcher, or to the respondents, and that their participation was voluntary;
- the designed questionnaire was sensitive to the use of language, especially with regards to race, ethnicity and use of other words that are derogatory to some section of the population; and
- the researcher also obtained ethical clearance from UNISA (see Appendix D).

3.16 CHAPTER SUMMARY

The chapter highlighted the research methodology, which was guided and informed by onion research process by Saunders *et al*. (2009). Positivism was adopted as a research philosophy. A quantitative research methodology was chosen because it is a method that assigns numerical values to data and uses statistical method to analyse the data. A systematic, random sampling method was used and it was hoped that the results from a chosen sample would be used to generalise to a wider Bulawayo SMEs population.

A cross-sectional, quantitative survey was used because it was deemed to produce quantitative data. Survey questionnaires were used to collect data from managers, owners or supervisors. The chapter highlighted the way in which issues of reliability and validity were treated. The tip end of the chapter discussed the way in which ethical issues were handled during the study. The primary data collected from questionnaires are presented in Chapter 4.

CHAPTER 4:
DATA ANALYSIS

4.0: INTRODUCTION

This chapter presents the findings from the questionnaire survey. Data was analysed quantitatively. Excel was used for descriptive analysis and SPSS was used for inferential statistical analysis. As stated in Chapter 1, the objectives of this research are:

1. to explore the state of readiness of SMEs in Bulawayo to migrate to cloud computing; and
2. to investigate factors that can affect the adoption of cloud computing by SMEs in Bulawayo.

Inferential statistics was used to answer the first objective, while descriptive analysis was used to answer the second.

4.1: RESPONSE RATE

There were 60 questionnaires sent out to the respondents. Out of these, 56 were returned, which represents a 93.3% response rate. From this batch of 56 questionnaires, two questionnaires had many unfilled spaces, and hence, were discarded. A total of 54 valid questionnaires were used to analyse the data. This number constituted a 90% response rate. This high response rate among other things was achieved by:

- physically taking the questionnaires to people and ask them kindly to complete in my presence;
- resending a new set of questionnaires to those who misplaced the first set of questionnaires; and
- calling them twice a week to remind them to complete the questionnaires.

Regardless of this effort, four questionnaires could still not be retrieved. On the last day of collection, the respondents were either absent from their premises, misplaced, or lost the questionnaires. The high response rate was, however, quite surprising and

contradicts with Rasmussen and Thimm (2009:85), who found out that SMEs generally "produce unsatisfying response rates."

4.2: CHARACTERISTICS OF SAMPLE

4.2.1 According to gender

Table 4.1: Gender of the respondents

		Frequency	Percent	Valid Percent
Valid	Male	33	61.1	61.1
	Female	21	38.9	38.9
	Total	54	100.0	100.0

Table 4.1 shows the gender of the respondents. From the table, (33) 61.1% of the respondents are males, while (21) 38.9% of the respondents are females.

Table 4.2 shows the position of respondents in the SMEs sampled.

Table 4. 2 Position of the respondents in the SME

		Frequency	Percent	Valid Percent
Valid	Owner	38	70.4	70.4
	Manager	16	29.6	29.6
	Total	54	100.0	100.0

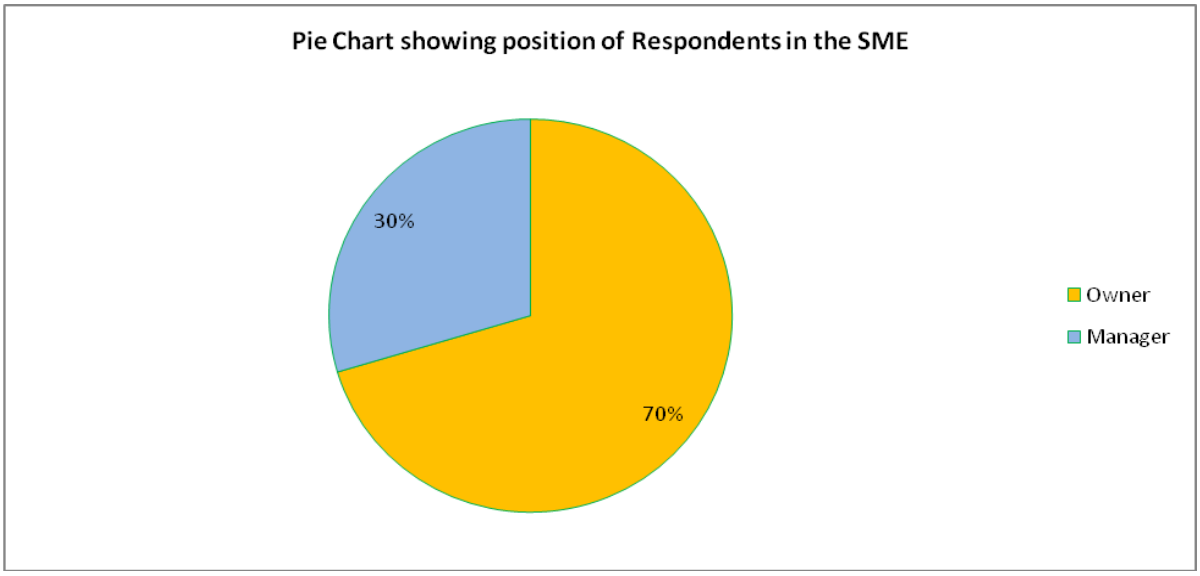

Figure 4.1: Pie-Chart showing position of respondents in the company

Table 4.2 shows that 38 (70.4%) of the respondents are owners of the SMEs included, and 16(29.6%) are managers. Figure 4.1 shows the same results in the form of a pie-chart. These two groups were deemed to occupy positions of authority in the organisation, and could articulate policies in the organisation with strong convictions. The results show that most respondents (70.4%) are the owners of SMEs while managers are few (29.6%).

4.2.2 Educational Qualifications of respondents

Table 4.3 shows educational qualifications of the respondents.

Table 4.3: Educational Qualifications of the respondents

		Frequency	Percent	Valid Percent
Valid	Secondary School	2	3.7	3.7
	Technical College	29	53.7	53.7
	First Degree/Bachelors	19	35.2	35.2
	Masters Degrees	3	5.6	5.6
	Other	1	1.9	1.9
	Total	54	100.0	100.0

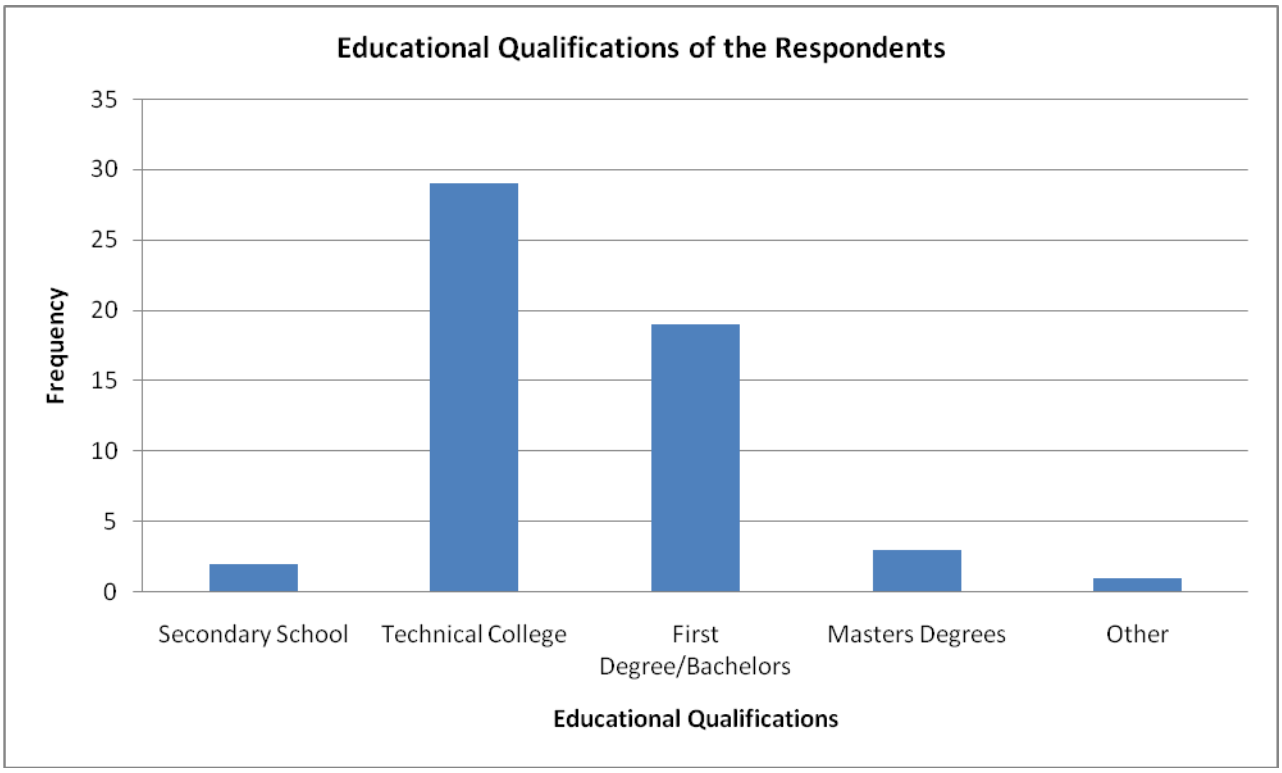

Figure 4.2: A graph showing Educational Qualifications of Respondents

Table 4.3 shows that the majority 29 (53.7%) of the respondents obtained a technical college qualification. Nineteen (35.2%) of the respondents obtained a bachelor's degree.

Only three (5.6%) obtained a master's degree, and two (3.7%) still use their secondary school qualifications. One percent of the respondents use another qualification, which could be primary certificate. Figure 4.2 graphically shows the same results as Table 4.2. The results show that people who possess qualifications from technical colleges (53.7%) manage most SMEs.

4.2.3 Type of business

Table 4.4 below show the type of business engaged by the sampled SMEs.

Table 4.4: Type of business engaged by SMEs

		Frequency	Percent	Valid Percent
Valid	Communication	1	1.9	1.9
	Construction	7	13.0	13.0
	Farming	3	5.6	5.6
	Pharmaceuticals	6	11.1	11.1
	Textile and Clothing	11	20.4	20.4
	Grocery/Food Processing	4	7.4	7.4
	Chemical/Electrical Products	4	7.4	7.4
	Manufacturing	3	5.6	5.6
	Carpentry & Wood Curving	4	7.4	7.4
	Finance	1	1.9	1.9
	Transport	3	5.6	5.6
	IT	3	5.6	5.6
	Other	4	7.4	7.4
	Total	54	100.0	100.0

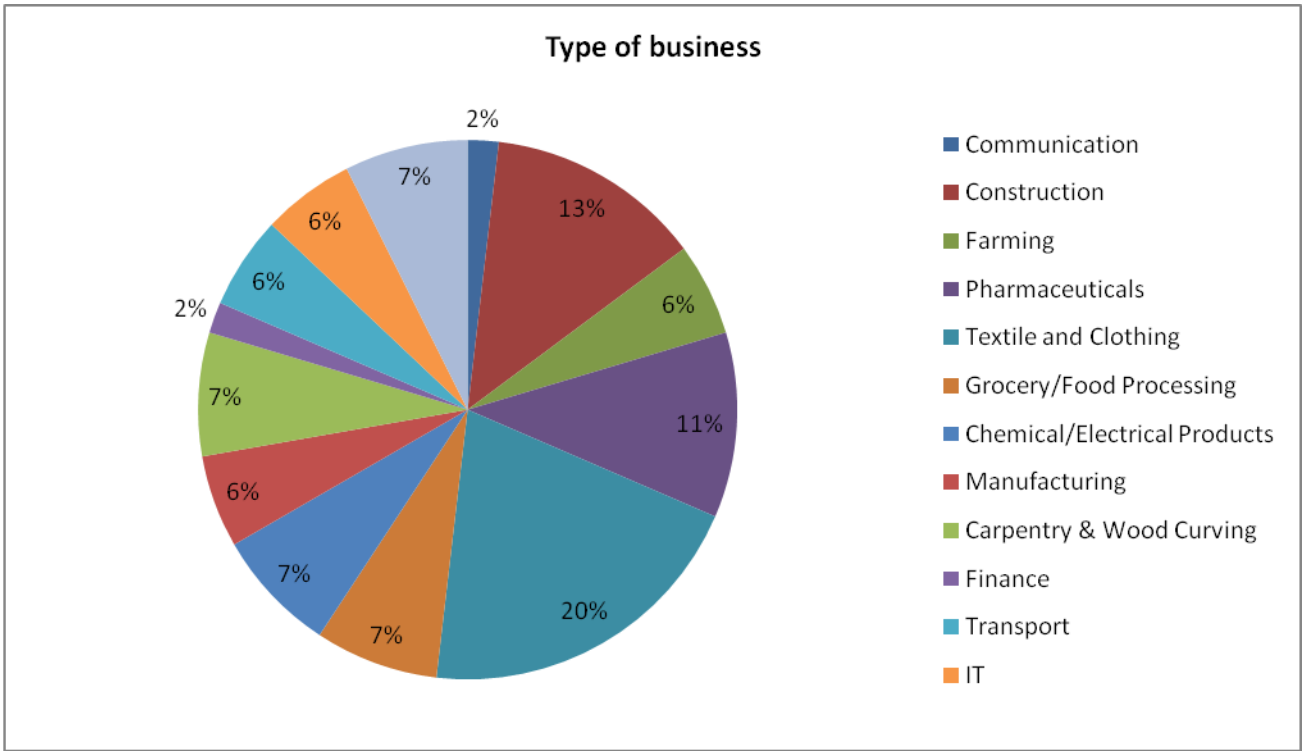

Figure 4.3: Pie-Chart showing Type of business engaged by SMEs

The results in Table 4.4 show eleven (20.4%) of the respondents are in the textile and clothing industry. This is followed by seven (13.0%) in the construction industry. Pharmaceuticals are third, with six (11%), and groceries/food processing are forth, with five (9%). Chemical/electrical products, carpentry & wood carving, transport and other (e.g. bookshops & stationery) are all at four (7%). Farming and IT have three (6%) while one (1.9%) of the respondents is from the communication industry. One (1.9%) was from finance. The results show that there is a wide spectrum of SMEs in Bulawayo and that the textile and clothing industry has the majority (20.4%) of the SMEs. Figure 4.3 graphically shows the same results as those in Table 4.4.

4.2.4: Number of Employees in the SME.

Table 4.5 shows the number of employees in the sampled SMEs.

Table 4.5: Number of employees in each SME.

		Frequency	Percent	Valid percent
Valid	1-9	50	92.6	92.6
	10-20	3	5.6	5.6
	21-50	1	1.9	1.9
	Total	54	100.0	100.0

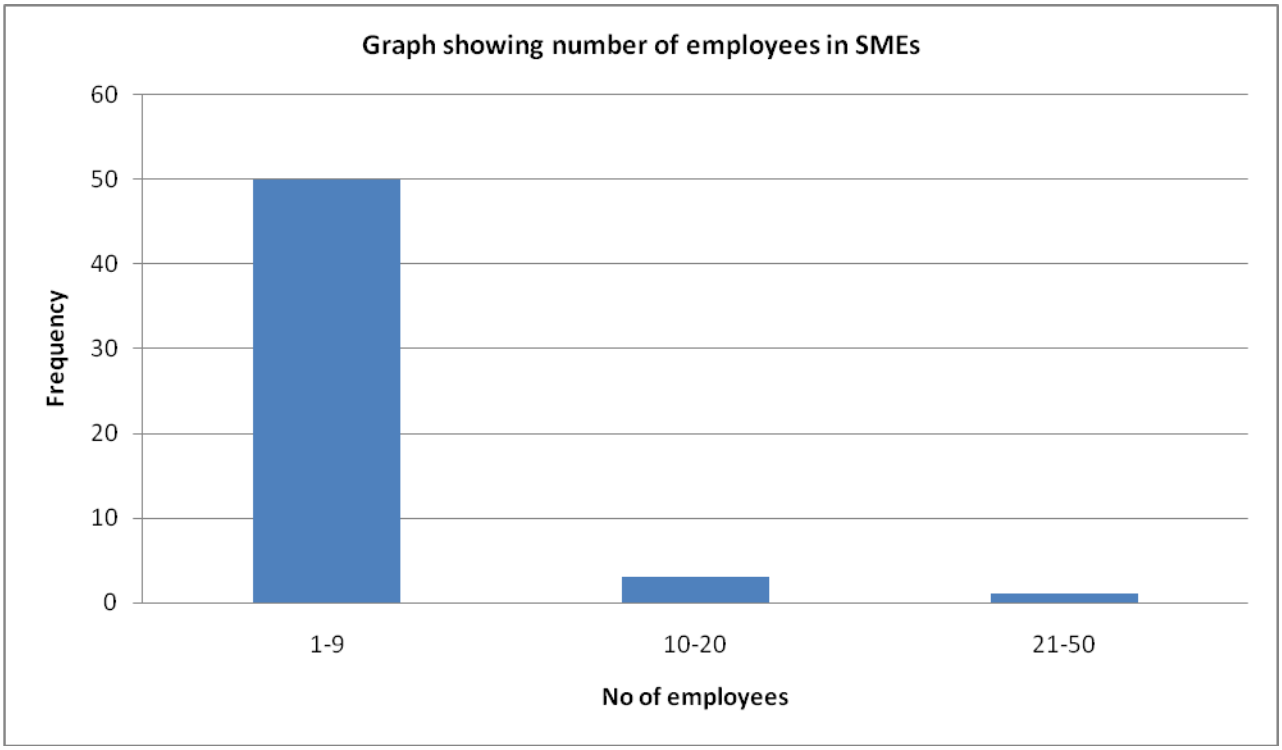

Figure 4.4: Showing Number of Employees in the SMEs.

Results from Table 4.5 show that the majority, at 50 (92.6%) of the SMEs, have between one and nine employees. Three (4%) of the SMEs have between 10 and 20 employees. The results also show that one (2%) of SMEs have between 21 and 50 employees. It should however, be noted that the ranges of number of employees are not uniform, and hence, could give wrong impression about the number of employees in each SME. The results in Table 4.5 are also shown in the form of a graph in Figure 4.4. The results show that 92.6% SMEs employ less than ten people.

4.2.5: Number of years in operation

Table 4.6 below shows the number of years the SME has been operating.

Table 4.6: Number of years in operation

		Frequency	Percent	Valid Percent
Valid	Less than a year	3	5.6	5.6
	1-5	40	74.1	74.1
	6-10	10	18.5	18.5
	11-15	1	1.9	1.9
	Total	54	100.0	100.0

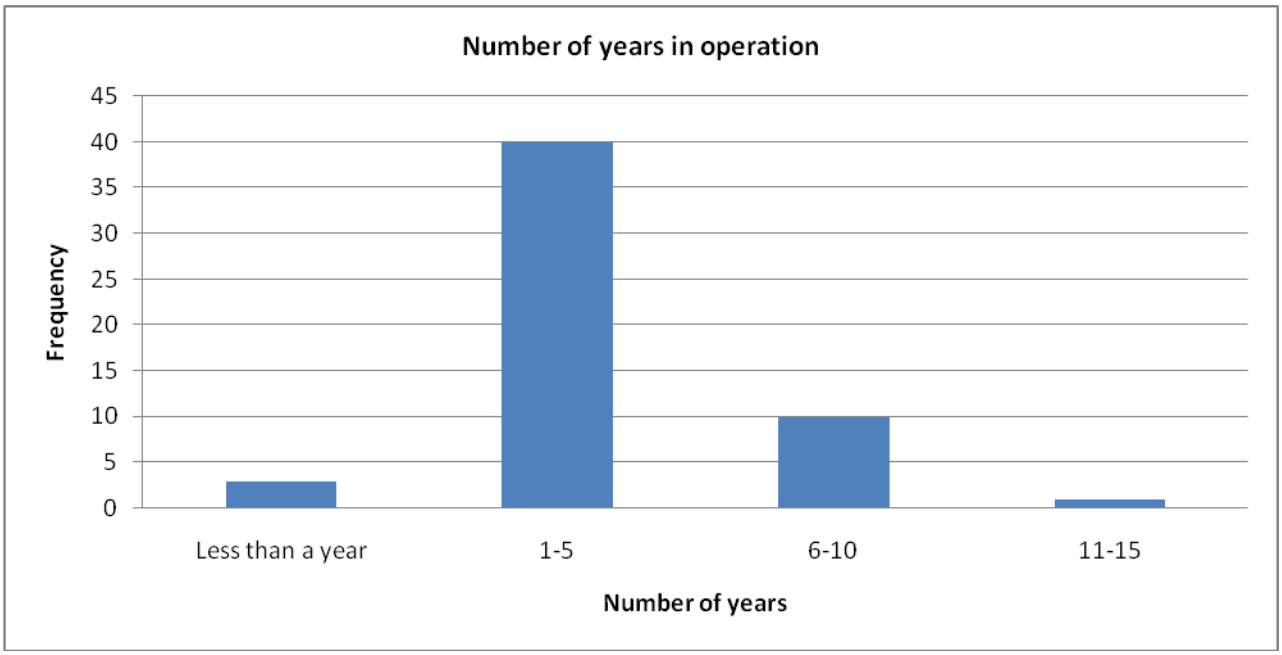

Figure 4.5: A graph showing number of years operating

The results in Table 4.6 show that the majority 40 (74.1%) of the SMEs have been in existence for between one and five years. There are three (5.6%) very young SMEs less than one year old. The results also show that 10(18.5%) of the SMEs have been in existence for between six and 10 years. There is only one oldest SME that has been in existence for between 11 and 15 years. There are no SMEs that have been in existence for more than 16 years from the sample. Figure 4.5 shows graphically the same results as shown in Table 4.6. The majority SMEs 74.1% are still young between one and five years of existence. This could mean that they may not have mature ICT systems in place.

4.3 FACTORS AFFECTING CLOUD COMPUTING ADOPTION BY SMES IN BULAWAYO

The following section details some identified factors that affect adoption of cloud computing by SMEs in Bulawayo.

4.3.1 National E-readiness factors

Respondents were asked to rate by indicating [X] whether they [1] [SD] strongly disagree; [2] [D] disagree; 3 [N] neutral; [4] [A] agree or [5] [SA] strongly agree with the statements in the table.

Table 4. 7: National E-readiness factors

Factors		1 Strongly Disagree	2 Disagree	3 Neutral	4 Agree	5 Strongly Agree	Total
F3 Power failure and lack of adequate electricity supply	Count	0	2	2	16	34	54
	Row N %	0.0%	3.7%	3.7%	29.6%	63.0%	100.0%
F4 Undeveloped online payment systems	Count	0	1	2	30	21	54
	Row N %	0.0%	1.9%	3.7%	55.6%	38.9%	100.0%
F5 Lack of information and popularity on online sale and products marketing	Count	0	2	0	30	22	54
	Row N %	0.0%	3.7%	0.0%	55.6%	40.7%	100.0%
F6 Few businesses use Internet (low Internet penetration in the country)	Count	0	2	2	34	16	54
	Row N %	0.0%	3.7%	3.7%	63.0%	29.6%	100.0%
F7 Government regulation	Count	2	1	4	34	13	54
	Row N %	3.7%	1.9%	7.4%	63.0%	24.1%	100.0%
F10 Lack of cloud service providers in the country	Count	0	1	0	30	23	54
	Row N %	0.0%	1.9%	0.0%	55.6%	42.6%	100.0%

Table 4.7 shows that majority of the respondents either agreed or strongly agreed with the itemised factors that can affect the adoption of cloud computing by SMEs in Bulawayo. Thirty four (63.0%) strongly agree, while 16 (29.9%) agree that power failure and lack of adequate electricity supply is one of the major factors that affect cloud computing adoption by SMEs in Bulawayo. Twenty-one (38.9%) strongly agreed and 30 (55.6%) agreed that undeveloped online payment systems area hindrance to cloud adoption by SMEs. Many respondents either strongly agreed (24.1%) or agreed (63%) that low Internet penetration is a barrier to cloud computing adoption. Only a small

percentage of 3.7% disagree. The results show that the SMEs face the following challenges to migrate to the cloud:

- like power failure and lack of adequate electricity supply
- undeveloped online payment systems
- low Internet penetration

4.3.2 People Factors

Respondents were asked to rate by indicating [X] whether they [1] [SD] strongly disagreed; [2] [D] disagreed; 3 [N] were neutral to; [4] [A] agreed or [5] [SA] strongly agreed with the statements in the table.

Table 4. 8: People factors

Factors		1 Strongly Disagree	2 Disagree	3 Neutral	4 Agree	5 Strongly Agree	Total
F11 Poor security systems to check Internet fraud and privacy issues	Count	0	1	1	46	6	54
	Row N %	0.0%	1.9%	1.9%	85.2%	11.1%	100.0%
F12 Lack of technological experts (skill) to handle the computer systems	Count	0	2	2	44	6	54
	Row N %	0.0%	3.7%	3.7%	81.5%	11.1%	100.0%
F14 Lack of IT skill in the organisation	Count	0	2	3	46	3	54
	Row N %	0.0%	3.7%	5.6%	85.2%	5.6%	100.0%
F19 Illiteracy of customers in computing/Internet	Count	0	2	2	46	4	54
	Row N %	0.0%	3.7%	3.7%	85.2%	7.4%	100.0%
F21 Low management commitment to cloud computing	Count	0	0	4	48	2	54
	Row N %	0.0%	0.0%	7.4%	88.9%	3.7%	100.0%

Table 4.8 shows that more than 80% of the respondents agree with the statements in the table. As many as 89.9% believe that one factor that affects the adoption of cloud computing by SMEs in Bulawayo is low management commitment. Table 4.9 shows similar results to those reflecting in Table 4.8, but adds a dimension of number of respondents (N), mean and standard deviation. The results show that the following factors are hindrances to adoption of cloud computing:

- Lack of IT skill in the organisation
- Low management commitment to cloud computing

Table 4.9: Mean descriptive statistics of people factors

	N	Mean	Std. Deviation
F11 Poor security systems to check Internet fraud and privacy issues	54	4.06	.452
F12 Lack of technological experts (skill) to handle the computer systems	54	4.00	.549
F14 Lack of IT skill in the organisation	54	3.93	.508
F19 Illiteracy of customers in computing/Internet	54	3.96	.513
F21 Low management commitment to cloud computing	54	3.96	.334

4.4: ORGANISATIONAL PREPAREDNESS

The following section details the readiness of SMEs to adopt cloud computing. The following factors have been identified to measure the readiness of SMEs to adopt cloud computing.

4.4.1 National e-readiness

Respondents were asked to respond to the following statement:

Please rate the extent to which your organisation is ready to adopt cloud computing as a business strategy. Rate by indicating [X] whether you: [1] [SD] strongly disagree; [2] [D] disagree; 3 [N] are neutral; [4] [A] agree, or [5] [SA] strongly agree.

Table 4.10: National E-Readiness

		1 Strongly Disagree	2 Disagree	3 Neutral	4 Agree	5 Strongly Agree	Total
OR21 The government demonstrates strong commitment to promote cloud computing.	Count	3	45	4	2	0	54
	Row N %	5.6%	83.3%	7.4%	3.7%	0.0%	100.0%
OR22 There is a supporting policy framework for SMEs to migrate to cloud computing.	Count	10	39	3	2	0	54
	Row N %	18.5%	72.2%	5.6%	3.7%	0.0%	100.0%
OR23 The existing policy framework for cloud computing is comprehensive.	Count	5	44	3	2	0	54
	Row N %	9.3%	81.5%	5.6%	3.7%	0.0%	100.0%
OR24 The existing legal framework for cloud computing is comprehensive.	Count	6	43	3	2	0	54
	Row N %	11.1%	79.6%	5.6%	3.7%	0.0%	100.0%
OR25 The presence of well-known cloud Computing vendors in the cloud market increases our confidence in cloud computing adoption.	Count	11	37	1	5	0	54
	Row N %	20.4%	68.5%	1.9%	9.3%	0.0%	100.0%

Table 4.10 shows that the majority of respondents either disagree or strongly disagree with statements in the table. As many as 83.3% disagree that the government demonstrates strong commitment to promote cloud computing in the country. An 81% majority of respondents believe that the existing policy framework of cloud computing is not comprehensive. Table 4.11 below shows a summary of the above table. It shows the number (N) of respondents, mean and standard deviation. The major challenges faced by SMEs from the results are:

- Lack of government commitment to promoting cloud computing
- Lack of existing policy framework for cloud computing

Table 4. 11: Descriptive statistics for E-Readiness

	N	Mean	Std. deviation
OR21 The government demonstrates strong commitment to promote cloud computing	54	2.09	.524
OR22 There is a supporting policy framework for SMEs to migrate to cloud computing	54	1.94	.627
OR23 The existing policy framework for cloud computing is comprehensive	54	2.04	.548
OR24 The existing legal framework for cloud computing is comprehensive	54	2.02	.566
OR25 The presence of well-known cloud computing vendors in the cloud market increases our confidence in cloud computing adoption	54	2.00	.777
Valid N (listwise)	54		

4.4.2 Organisational Governance

Respondents were asked to rate by indicating [X] whether they [1] [SD] strongly disagree; [2] [D] disagree; 3 [N] neutral; [4] [A] agree or [5] [SA] strongly agree with the statements in the table.

Table 4. 12: Organisational Governance

FACTOR		**1 Strongly Disagree**	**2 Disagree**	**3 Neutral**	**4 Agree**	**5 Strongly Agree**	**Total**
OR1 Our organisation is aware of cloud computing implementations in our partner organisations.	Count	12	33	4	3	2	54
	Row N%	22.2%	61.1%	7.4%	5.6%	3.7%	100.0%
OR5 Our organisation has a clear vision for Cloud computing.	Count	4	41	6	2	1	54
	Row N%	7.4%	75.9%	11.1%	3.7%	1.9%	100.0%
OR6 Our vision of Cloud computing activities is widely communicated and understood throughout our company.	Count	4	44	4	1	1	54
	Row N %	7.4%	81.5%	7.4%	1.9%	1.9%	100.0%
OR7 Roles, responsibilities and accountability are clearly defined within each cloud computing initiative.	Count	5	42	4	3	0	54
	Row N %	9.3%	77.8%	7.4%	5.6%	0.0%	100.0%
OR8 We have enough technical skills (human capacity) to deploy and implement the cloud.	Count	4	40	6	4	0	54
	Row N %	7.4%	74.1%	11.1%	7.4%	0.0%	100.0%
OR20 We believe that there are effective laws to protect our privacy and our customer privacy on the cloud.	Count	1	45	4	3	1	54
	Row N %	1.9%	83.3%	7.4%	5.6%	1.9%	100.0%

Table 4.12 shows that the majority of respondents either disagree or strongly disagree with the statements in the table. A majority 83.3% disagree with the statement: “we believe that there are effective laws to protect our privacy and our customer privacy on the cloud”. It was further discovered that 81.5% of the respondents are not consulted with regards to the cloud computing vision of the organisation. Table 4.13 below shows descriptive statistics of Table 4.12, which shows a number of respondents’ (N), mean and standard deviation. The results show that SMEs are worried about security and privacy of their data and that there is not shared vision between management and the employees.

Table 4. 13: Organisational Preparedness-Governance

	N	Mean	Std. Deviation
OR1 Our organisation is aware of Cloud computing implementations in our partner organisations.	54	2.07	.929
OR6 Our vision of Cloud computing activities is widely communicated and understood throughout our company.	54	2.09	.622
OR7 Roles, responsibilities and accountability are clearly defined within each Cloud computing initiative.	54	2.09	.622
OR8 We have enough technical skills (human capacity) to deploy and implement the cloud.	54	2.19	.675
OR5 Our organisation has a clear vision for cloud computing.	54	2.17	.694
OR20 We believe that there are effective laws to protect our privacy and our customer privacy on the cloud.	54	2.22	.664
Valid N (listwise)	54		

4.4.3 Organisational Technology

Respondents were asked to rate by indicating [X] whether they [1] [SD] strongly disagree; [2] [D] disagree; 3 [N] are neutral; [4] [A] agree or [5] [SA] strongly agree to the statements in the table.

Table 4. 14: Organisational Preparedness-Technology

		1 Strongly Disagree	2 Disagree	3 Neutral	4 Agree	5 Strongly Agree	Total
OR9 We have considered/evaluated the impact of cloud computing to the way our sector operates.	Count	9	37	4	4	0	54
	Row N %	16.7%	68.5%	7.4%	7.4%	0.0%	100.0 %
OR10 We have sufficient Internet bandwidth to utilise cloud computing.	Count	10	35	2	7	0	54
	Row N %	18.5%	64.8%	3.7%	13.0 %	0.0%	100.0 %
OR11 Our organisation is well connected to a local area network (LAN) and a wide area network (WAN).	Count	8	38	4	4	0	54
	Row N %	14.8%	70.4%	7.4%	7.4%	0.0%	100.0 %
OR12 We can afford high bandwidth connectivity to the Internet.	Count	8	38	4	4	0	54
	Row N %	14.8%	70.4%	7.4%	7.4%	0.0%	100.0 %
OR13 The telecommunications infrastructure is reliable and efficient to support cloud computing.	Count	8	36	3	7	0	54
	Row N%	14.8%	66.7%	5.6%	13.0 %	0.0%	100.0 %
OR14 We have thoroughly analysed the possible changes required to take effect in our organisation, suppliers, partners, and customers as a result of each cloud computing implementation.	Count	15	32	2	5	0	54
	Row N %	27.8%	59.3%	3.7%	9.3%	0.0%	100.0 %

The information in the Table 4.14 was used to draw a graph below. The clustered graph shows how many people agreed or disagreed with a posed statement.

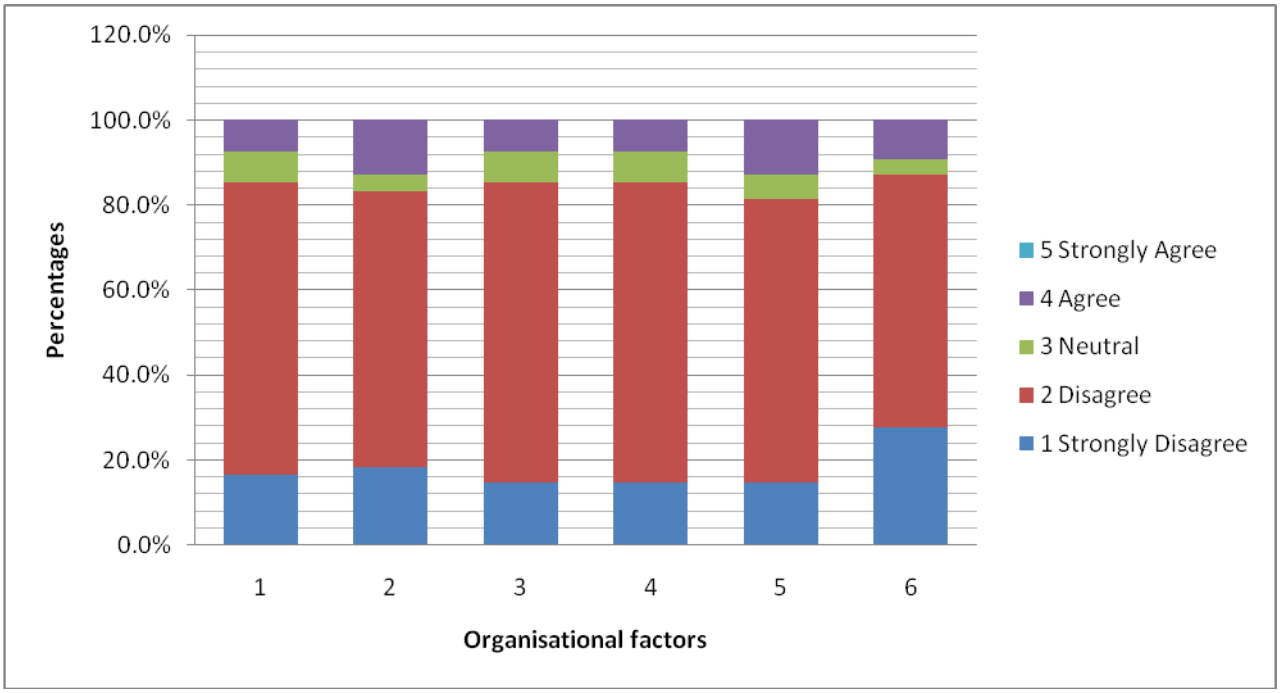

Figure 4.6: Organisational factors - Technology

Table 4. 15: Key table

Key	Factors
1	OR9 We have considered/evaluated the impact of Cloud computing to the way our sector operates.
2	OR10 We have sufficient Internet bandwidth to utilise Cloud computing.
3	OR11 Our organisation is well connected to a Local Area Network (LAN) and a Wide Area Network (WAN).
4	OR12 We can afford high bandwidth connectivity to the Internet.
5	OR13 The telecommunications infrastructure is reliable and efficient to support Cloud computing.
6	OR14 We have thoroughly analysed the possible changes required to take effect in our organisation, suppliers, partners, and customers as a result of each Cloud computing implementation.

Table 4.14 shows that respondents either disagree or strongly disagree with statements in the table. The two statements “Our organisation is well connected to a Local Area Network (LAN) and a Wide Area Network (WAN)” and “We can afford high bandwidth connectivity to the Internet” have both 70.4% respondents who are disagreeing with the

statements. Table 4.15 is showing the key to Figure 4.6. Table 4.16 shows number of respondents (N), Mean and Standard Deviation of statements mentioned in Table 4.14 above. The results show that majority of the SMEs are not technologically mature to migrate to the cloud. They still lack reliable telephone system and cannot afford high bandwidth connectivity.

Table 4. 16: Descriptive statistics of organisational preparedness-Technology

	N	Mean	Std. Deviation
OR9 We have considered/evaluated the impact of cloud computing to the way our sector operates.	54	2.06	.738
OR10 We have sufficient Internet bandwidth to utilise cloud computing.	54	2.11	.861
OR11 Our organisation is well connected to a local area network (LAN) and a wide area network (WAN).	54	2.07	.723
OR12 We can afford high bandwidth connectivity to the Internet.	54	2.07	.723
OR13 The telecommunications infrastructure is reliable and efficient to support Cloud computing.	54	2.17	.841
OR14 We have thoroughly analysed the possible changes required to take effect in our organisation, suppliers, partners, and customers as a result of each Cloud computing implementation.	54	1.94	.834
Valid N (listwise)	54		

4.4.4 Organisational IT infrastructure

This section highlights IT infrastructure in the SMEs. Respondents were asked questions below and each table summaries their response.

Question: **Do you have a stand-alone IT department?**

Table 4.17: Stand-alone IT department

		Frequency	Percent	Valid Percent
Valid	No	49	90.7	90.7
	Yes	5	9.3	9.3
	Total	54	100.0	100.0

From Table 4.17, it can be observed that 49 (90.7%) of the respondents answered no to the above question. Only five (9.3%) of the SMEs have a stand-alone IT department. The results show that majority of the SMEs do not have IT departments and this could mean that they may not have mature IT systems in place to help them migrate to cloud computing.

Question: **Do you out-source IT functions?**

Table 4.18: Out-source IT functions

		Frequency	Percent	Valid Percent
Valid	No	42	77.8	77.8
	Yes	12	22.2	22.2
	Total	54	100.0	100.0

From Table 4.18, the majority of SMEs 77.8% do not out-source IT functions. Only 22.2% out-source some IT functions. The results could mean that the majority of the SMEs do not have sophisticated IT systems that could act as a foundation to migrate to the cloud.

Question: **Do you have an IT system or a special software package that you use in your business?**

Table 4. 19: Using special IT software

		Frequency	Percent	Valid Percent
Valid	No	40	74.1	74.1
	Yes	14	25.9	25.9
	Total	54	100.0	100.0

Table 4.19 shows responses to the question above. The responses show that (40) 74.1% do not have special bespoke software, where 25.9% have this special software they use in their businesses. The majority of the SMEs use simple off the shelf software, they do not have their own tailor made software.

Question: **Are you connected to the Internet?**

Table 4. 20: Internet connection

		Frequency	Percent	Valid Percent
Valid	No	3	5.6	5.6
	Yes	51	94.4	94.4
	Total	54	100.0	100.0

Table 4.20 shows that (54) 94.4% of the respondents are connected to the Internet, with only three (5.6%) not connected to the Internet. The majority, 94.4% of the SMEs are connected to the Internet. This could be a positive sign that could enable them to think seriously about migrating to the cloud.

Question: **How do you access the Internet?**

Table 4. 21: Type of Internet access

		No	Yes	Total
Dial_Up	Count	53	1	54
	Row N %	98.1%	1.9%	100.0%
ISDN	Count	48	6	54
	Row N %	88.9%	11.1%	100.0%
Wi_Fi	Count	11	43	54
	Row N %	20.4%	79.6%	100.0%
XDSL	Count	53	1	54
	Row N %	98.1%	1.9%	100.0%

Table 4.21 shows methods of accessing the Internet by SMEs in Bulawayo. The responses show that majority of SMEs 43 (79.6%) are connected to the Internet by Wi-Fi. A minority of 11.6% of SMEs use ISDN, while two SMEs 1.9% each use Dial-up and XDSL, respectively. Most SMEs are connected to the Internet using wifi. This could mean that maybe wifi is cheaper. However, some view wifi as having low bandwidth to support huge data transfers.

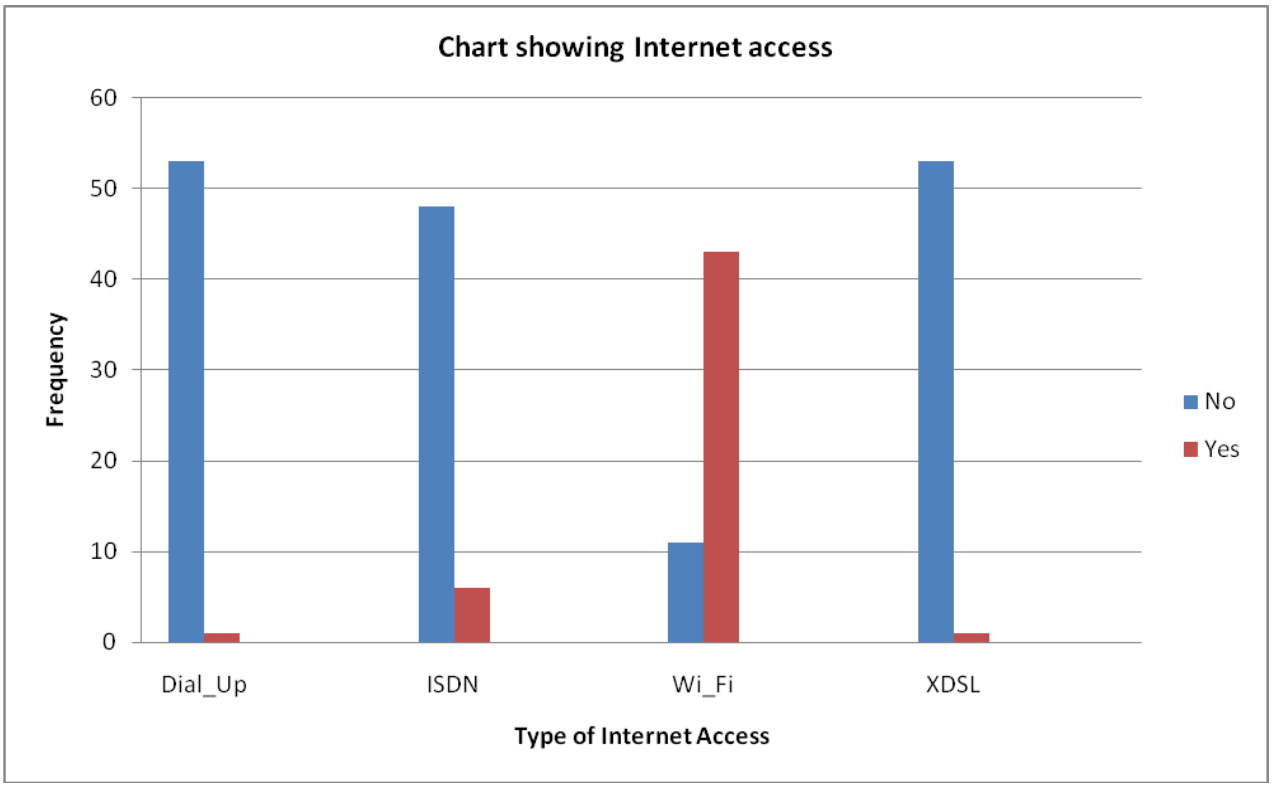

Figure 4.7: Showing how SMEs access the Internet

Figure 4.7 shows how SMEs access the Internet. Wi-Fi is dominant, followed by ISDN, while Dial-up and XDSL received an equal response, at one SME each.

Question: **What do you use the Internet for?**

Table 4. 22: What the Internet is used for in the SMEs

		No	Yes	Total
General Information Research	Count	6	48	54
	Row N %	11.1%	88.9%	100.0%
Provides information about company's products, services	Count	44	10	54
	Row N %	81.5%	18.5%	100.0%
Order exchange with suppliers & customers	Count	48	6	54
	Row N %	88.9%	11.1%	100.0%
E-purchasing &e-payments	Count	50	4	54
	Row N %	92.6%	7.4%	100.0%
Records (collection, analysis & reporting of data)	Count	26	28	54
	Row N %	48.1%	51.9%	100.0%
Receiving customer feedback	Count	47	7	54
	Row N %	87.0%	13.0%	100.0%
E-commerce	Count	45	9	54
	Row N %	83.3%	16.7%	100.0%

Respondents were asked to answer yes or no to the statements in the table on what they use the Internet for. Table 4.22 shows that 88.9% of the SMEs use the Internet for general information research; 51.9% of the respondents use the Internet for records (collection, analysis & reporting of data); 18.5% of respondents use the Internet to provide information about company's products and services; a mere 11.1% use the Internet for order exchange with suppliers & customers; 7.4% of respondents use the Internet to do e-purchasing & e-payments;13.0% of the SMEs use the Internet for receiving customer feedback; and 16.7% use the Internet for e-commerce.

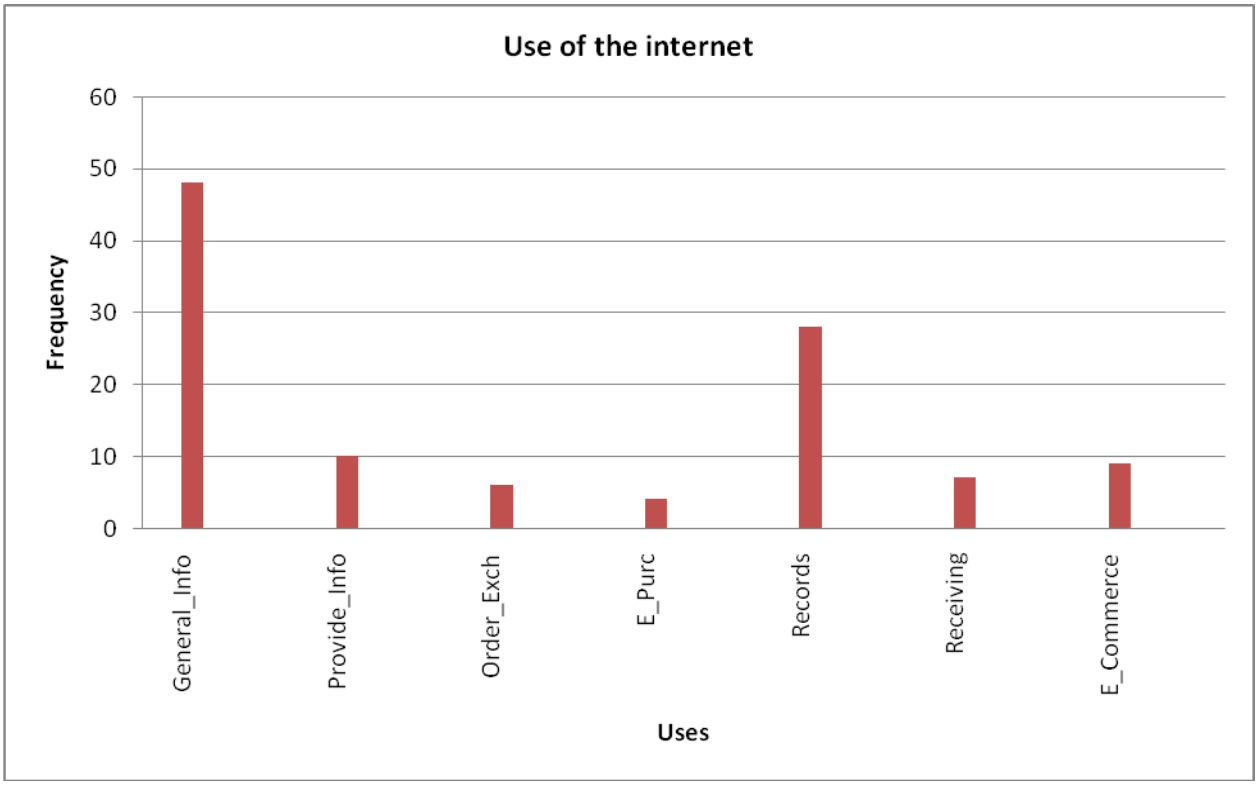

Figure 4.8: Showing how SMEs use the Internet.

Figure 4.8 shows the information from Table 4.22 on how SMEs use the Internet. The results show that many SMEs (88.9%) are using the Internet for general information research and not promoting their products on the Internet.

Question: **Are your computers networked?**

Table 4. 23: Computer Network

		Frequency	Percent	Valid Percent
Valid	No	42	77.8	77.8
	Yes	12	22.2	22.2
	Total	54	100.0	100.0

A majority of 79.8% of the SMEs do not have computers that are networked. Only (12) 22.2% answered yes to the above question. This shows that majority of SMEs do not have networked computers. This means different SMEs departments cannot share data online.

Question: **Do you have a web address?**

Table 4. 64: SMEs with Web address

		Frequency	Percent	Valid Percent
Valid	No	44	81.5	81.5
	Yes	10	18.5	18.5
	Total	54	100.0	100.0

Table 4.24 shows responses to the question posed as to on whether or not the SMEs have a web address. The results show an overwhelming 81.5% do not have a web address. Only 18.5% of the SMEs have web address. This means that 81.5% of the SMEs cannot advertise their products on the Internet.

Question**: What type of customers do you deal with?**

Table 4. 75: Type of customers SMEs deal with

Customers		0 No	1 Yes	Total
Local	Count	10	44	54
	Row N %	18.5%	81.5%	100.0%
National	Count	39	15	54
	Row N %	72.2%	27.8%	100.0%
Regional	Count	50	4	54
	Row N %	92.6%	7.4%	100.0%
International	Count	53	1	54
	Row N %	98.1%	1.9%	100.0%

Table 4.25 shows responses regarding the type of customers the SMEs encounter. The majority of SMEs 81.5% deal with local customers and 27.8% deal with national customers, while 7.4% of SMEs deal with regional customers and only a paltry 1.9% of SMEs deal with international customers. The results show that the SMEs are not using IT to advertise their products beyond local markets.

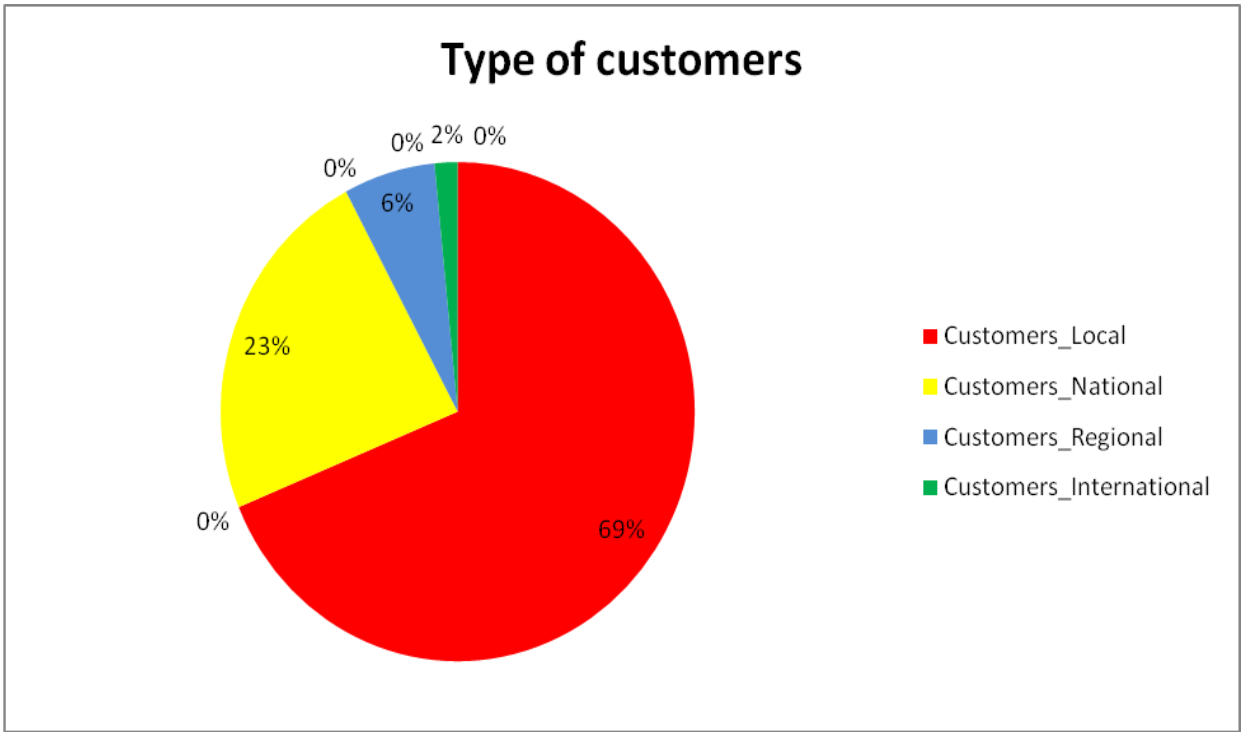

Figure 4.9: Showing Type of customers SMEs deal with

Figure 4.9 shows the type of customers SMEs deal with. As noted in the table, the majority of SMEs (69%) only service local customers.

Payment methods of customers

Table 4. 26: Payment method by customers

		No	Yes	Total
Cash deposits	Count	3	51	54
	Row N %	5.6%	94.4%	100.0%
Bank transfers	Count	45	9	54
	Row N %	83.3%	16.7%	100.0%
Cheques	Count	52	2	54
	Row N %	96.3%	3.7%	100.0%
E-payments	Count	52	2	54
	Row N %	96.3%	3.7%	100.0%

Table 4.26 shows that most SMEs (51) 94.4% prefer that customers make cash deposits for their transactions. About 16.7% of SMEs use bank transfers when making transactions, while e-payments and Cheques make up 3.7% of transactions. It appears clear that most SMEs still use cash in their business transactions. The results show that SMEs prefer cash paying customers. This could mean that the online payment methods

are not well developed and hence most SMEs prefer cash instead of other payment methods.

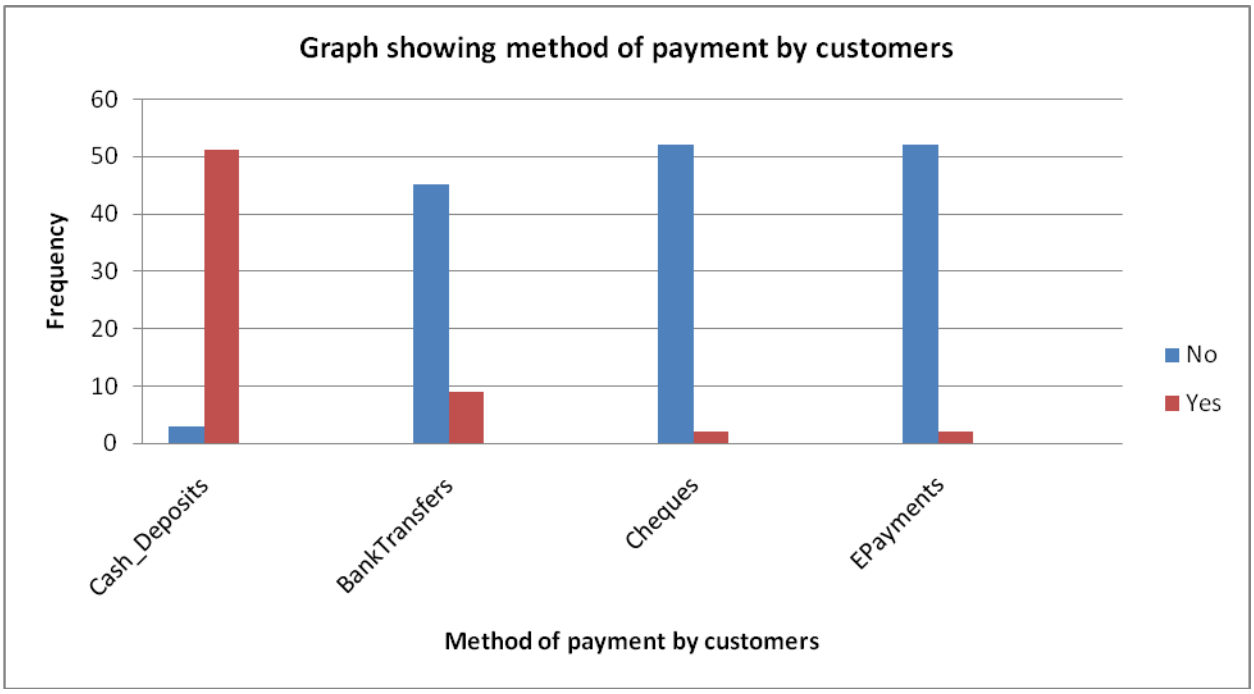

Figure 4.10: Showing method of payment by customers

Figure 4.10 is a visual presentation of Table 4.26. It shows that the yes for cash deposits is the most prominent method of payments.

Question: **What type of Suppliers do you deal with?**

Table 4. 27: Types of suppliers

Suppliers		No	Yes	Total
Local	Count	9	45	54
	Row N %	16.7%	83.3%	100.0%
National	Count	43	11	54
	Row N %	79.6%	20.4%	100.0%
Regional	Count	50	4	54
	Row N %	92.6%	7.4%	100.0%
International	Count	51	3	54
	Row N %	94.4%	5.6%	100.0%

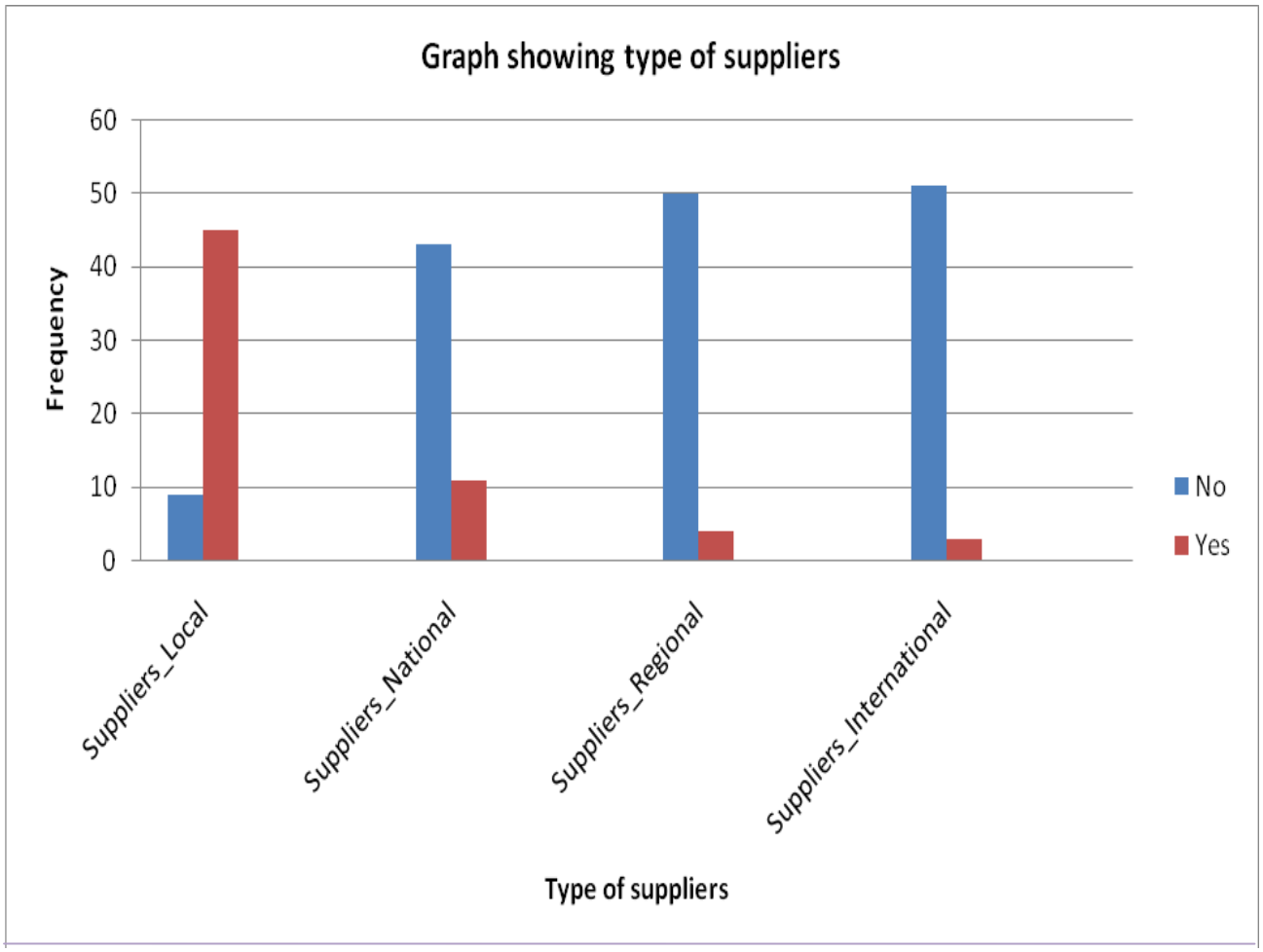

Figure 4.11: Showing type of suppliers SMEs deal with

Table 4.27 and figure 4.11 detail type of suppliers the SMEs in Bulawayo deal with. Figure 4.10 clearly shows that the majority 45 (83.3%) SMEs deal with local suppliers. Eleven (20.4%) SMEs indicated that they deal with national suppliers in their businesses. National suppliers are those found in the country outside Bulawayo. The results show that the SMEs prefer local suppliers maybe because they do not have technology to access other suppliers.

Question: **How do you pay your suppliers?**

Table 4. 28: Method of payments to the suppliers

		No	Yes	Total
Bank_Cash_Deposits	Count	6	48	54
	Row N %	11.1%	88.9%	100.0%
Bank_Transfers	Count	45	9	54
	Row N %	83.3%	16.7%	100.0%
Cheque	Count	51	3	54
	Row N %	94.4%	5.6%	100.0%
E-payments	Count	49	5	54
	Row N %	90.7%	9.3%	100.0%

Table 4.28 shows information about how SMEs pay their suppliers. Forty-eight bank cash deposits (89.9%) are dominant in their business transactions with their suppliers. This is followed by 9 bank transfers (16.7%) and 5 e-payments, (9.3%) while cheques are a distant last with three (5.6%). This could mean that the online payment methods are not well developed and hence most SMEs prefer to pay in cash instead of other payment methods.

4.4.5 Industrial Relations

Respondents were asked to rate by indicating [X] whether they [1] [SD] strongly disagree; [2] [D] disagree; 3 [N] neutral; [4] [A] agree or [5] [SA] strongly agree to the statements in the table.

Table 4. 29: Relations of SMEs with their customers and other industries

		1 Strongly Disagree	2 Disagree	3 Neutral	4 Agree	5 Strongly Agree	Total
OR15 "We believe that our customers are ready to do business on a cloud computing environment".	Count	7	38	7	2	0	54
	Row N %	13.0%	70.4%	13.0%	3.7%	0.0%	100.0%
OR18 "We believe that there are effective laws to protect our privacy and our customer privacy on the cloud."	Count	3	36	10	3	2	54
	Row N %	5.6%	66.7%	18.5%	5.6%	3.7%	100.0%
OR19 "Our organisation partners and/or customers are capable of supporting cloud computing transactions."	Count	1	45	4	4	0	54
	Row N %	1.9%	83.3%	7.4%	7.4%	0.0%	100.0%
OR26 Cloud services providers (CSP) offer better security services than currently available in our organisation.	Count	3	39	10	2	0	54
	Row N %	5.6%	72.2%	18.5%	3.7%	0.0%	100.0%
OR27 Cloud computing results in security enhancement.	Count	3	32	13	6	0	54
	Row N %	5.6%	59.3%	24.1%	11.1%	0.0%	100.0%

Table 4.29 shows that most SMEs disagreed or remained neutral to the statements in the table. Forty-five (83.3%) of SMEs disagreed with this statement "our organisation partners and/or customers are capable of supporting cloud computing transactions". This means that there are no partners who are capable of supporting the cloud computing industry.

4.4 INFERENTIAL STATISTICS

4.4.1 Kaiser-Meyer-Olkin (KMO) measure of sampling Adequacy/Bartlett's test of sphericity

Table 4. 30: Kaiser-Meyer-Olkin (KMO) Measure of sampling Adequacy/Bartlett's test of Sphericity

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.840
Bartlett's Test of Sphericity	**Approx. Chi-Square**	1206.916
	df	253
	Sig.	.000

Table 4.30 shows results of Kaiser-Meyer-Olkin (KMO) measure of sampling Adequacy/ Bartlett's test of sphericity. KMO and Bartlett's test of sphericity was used to test or assess how suitable the respondents' data were for analysis. According to Williams et al. (2010:5), "the KMO index ranges from zero to one, with 0.50 considered suitable for factor analysis." Pallant, (2013:174) notes that the KMO index "is used to test strength of relationship between variables." For the factor analysis to be suitable, the Bartlett's Test of sphericity should be significant $p < 0.05$. The KMO value was 0.840, which is considered good (Malhotra, 2007:615) and the Bartlett's test of sphericity has a value of $p = 0.000$, which is less than $p = 0.05$. The results show that the data were suitable for factor analysis.

4.4.2 Factor Analysis

Factor analysis, according to Williams *et al*. (2010:2), is a multivariate statistical procedure, which helps to reduce a large number of variables into a smaller, more manageable set of variables (also referred to as factors). Bryman and Cramer cited in Parsian and Dunning (2009:4), define factor analysis as a "statistical method commonly used […] to cluster items into common factors, interpret each factor according to the items with a high loading, and summarise the items into a small number of factors." It helps to group similar factors together (Pallant, 2013:185). According to Williams *et al*.

(2012:9) factor analysis "isolates those factors that when taken together, explain the majority of the responses."

4.4.3 Extraction of Factors

Table 4. 31: Total variance explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Vari-ance	Cumu-lative %
1	11.768	51.165	51.165	11.768	51.165	51.165	4.958	21.554	21.554
2	2.667	11.594	62.759	2.667	11.594	62.759	4.379	19.039	40.593
3	1.790	7.784	70.543	1.790	7.784	70.543	4.118	17.903	58.496
4	1.153	5.013	75.556	1.153	5.013	75.556	3.924	17.060	75.556
5	.865	3.759	79.315						
6	.722	3.140	82.455						
7	.636	2.766	85.222						
8	.521	2.264	87.486						
9	.468	2.033	89.519						
10	.442	1.923	91.442						
11	.342	1.489	92.931						
12	.286	1.244	94.175						
13	.247	1.074	95.248						
14	.229	.996	96.244						
15	.181	.787	97.032						
16	.158	.688	97.719						
17	.142	.618	98.337						
18	.137	.597	98.934						
19	.070	.305	99.239						
20	.062	.268	99.507						
21	.056	.244	99.751						
22	.033	.144	99.895						
23	.024	.105	100.000						

Extraction Method: Principal Component Analysis.

The items of organisational preparedness were subjected to principal component analysis (PCA) using SPSS version twenty-two. PCA is recommended when no prior theory or model exits (Williams *et al.*, 2010:6). Thompson and Daniel (1996), in Williams *et al*., 2010:6), recommend that "the simultaneous use of multiple decision rules is appropriate, and often desirable during factor extraction." PCA revealed the presence of

four components with Eigenvalue of less than one. The total variance explaining is 75.556 percent. After that, the factors were rotated to make them easier to understand and interpret (Pallant, 2013:185).

4.4.4 Rotated Component Matrix

Table 4.32: Rotated complex matrix

	Component			
	1	2	3	4
OR6 Our vision of cloud computing activities is widely communicated and understood throughout our company.	.806	.195	.400	.019
OR7 Roles, responsibilities and accountability are clearly defined within each cloud computing initiative.	.775	.356	.296	.091
OR1 Our organisation is aware of cloud computing implementations in our partner organisations.	.768	.060	.158	.032
OR8 We have enough technical skills (human capacity) to deploy and implement the cloud.	.759	.216	.134	.271
OR20 We believe that there are effective laws to protect our privacy and our customer privacy on the cloud.	.674	.161	.462	.154
OR5 Our organisation has a clear vision for cloud computing.	.664	.341	.354	.076
OR12 We can afford high bandwidth connectivity to the Internet.	.093	.864	.192	.040
OR11 Our organisation is well connected to a local area network (LAN) and a wide area network (WAN).	.282	.835	.023	.212
OR10 We have sufficient Internet bandwidth to utilise cloud computing.	.195	.758	.222	.267
OR13 The telecommunications infrastructure is reliable and efficient to support cloud computing.	.302	.693	.491	.260
OR9 We have considered/evaluated the impact of cloud computing to the way our sector operates.	.616	.645	.157	.102

OR14 We have thoroughly analysed the possible changes required to take effect in our organisation, suppliers, partners, and customers as a result of each cloud computing implementation.	.304	.621	.446	.218
OR19 Our organisation partners and/or customers are capable of supporting cloud computing transactions.	.412	.278	.739	.100
OR18 We believe that there are effective laws to protect our privacy and our customer privacy on the cloud.	.417	.339	.704	.081
OR27 Cloud computing results in security enhancement.	.170	.076	.687	.337
OR29 We feel that there is efficient and affordable support from the local IT industry to support move to cloud computing.	.380	.342	.647	.178
OR15 We believe that our customers are ready to do business on a cloud computing environment.	.245	.446	.635	.275
OR26 Cloud Services Providers (CSP) offer better security services than currently available in our organisation.	.323	.003	.625	.433
OR23 The existing policy framework for cloud computing is comprehensive.	.067	.201	.065	.929
OR24 The existing legal framework for Cloud Computing is comprehensive	.095	.195	.136	.881
OR22 There is a supporting policy framework for SMEs to migrate to cloud computing.	.077	-.005	.205	.842
OR21 The government demonstrates strong commitment to promote cloud computing.	.037	.287	.303	.662
OR25 The presence of well-known cloud computing vendors in the cloud market increases our confidence in cloud computing adoption.	.505	.214	.227	.597

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.[a]

a. Rotation converged in six iterations.

Rotation method used was Varimax. This method produces factor structures that are related (Williams *et al.*, 2010:9). Rotation maximises high item loadings and minimises low item loadings, therefore producing a more interpretable and simplified solution (Williams *et al*., 2010:9). The rotated component matrix produced four components with

loadings > 0.5. The Rotated Component Matrix table corresponds with total variance Table (Table 4.31) which has also four components. The component matrix table shows that each item is loading higher on its component than the others. Component 1, 2 and 3 were deemed to have similar variables so they were merged to create one factor called 'organisational preparedness' and Component Four was called 'national e-readiness'.

4.4.5 Reliability Tests

The following table shows construct reliability coefficients of different variables:

Table 4.33: Reliability coefficients of different variables

Variable	Number of Indicators	Cronbach Alpha	Reliability Interpretation
External influence benefits	6	0.892	Good
Organisational benefits	5	0.752	Acceptable
Barriers- National readiness	7	0.835	Good
Barriers- Organisational preparedness	5	0.800	Good
Factors- Governance	6	0.835	Good
Factors- People	5	0.805	Good
Organisational preparedness-governance	6	0.832	Good
Organisational preparedness-technology	6	0.926	Excellent
Business environment	6	0.807	Good
Reliability of system	5	0.662	Questionable

Reliability test evaluates the quality of research instrument. Good quality research instrument increases reliability. Reliability is measured by the Cronbach alpha coefficient. The Cronbach Coefficient ranges from 0 to 1 and the closer it is to 1 the greater the internal consistency of items in the scale (Gliem and Gliem, 2003:1). George and Mallery (2003) in Chiu and Liu (2008:216) provided the following rules of thumb for Cronbach's alpha coefficient interpretation:

Alpha (α) < 0.5 unacceptable

Alpha (α)> 0.5 poor

Alpha (α) > 0.6 questionable

Alpha (α)> 0.7 acceptable

Alpha (α) > 0.8 good

Alpha (α) > 0.9 excellent

A cut-off value of 0.7 was used to test the reliability of the variables.

4.4.6 Correlation Analysis

Table 4. 34: Correlations

		Cloud_Adoption	National_EReadiness	OP
Cloud_Adoption	Pearson Correlation	1	.097	.436**
	Sig. (2-tailed)		.506	.002
	N	49	49	49
National_EReadiness	Pearson Correlation	.097	1	.624**
	Sig. (2-tailed)	.506		.000
	N	49	49	49
OP	Pearson Correlation	.436**	.624**	1
	Sig. (2-tailed)	.002	.000	
	N	49	49	49

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

Correlation illustrates the direction and strength of a relationship between two variables (Pallant, 2007:78). The Pearson correlation between cloud adoption readiness and national e-readiness is 0.077 and p =0. 253, which is greater than p = 0.05. This shows us that the correlation is satisfactory, not significant. We can conclude that there is a strong correlation between the two variables of national e-readiness and organisational preparedness (r=0.624, p= 0.000).

4.4.7 Regression Analysis

Table 4. 35: Regression table

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	**Regression**	160.036	2	80.018	7.243	.002[b]
	Residual	508.168	46	11.047		
	Total	668.204	48			

a. Dependent variable: Cloud adoption readiness of your organisation to adopt cloud computing

b. Predictors: (Constant), OP, industrial relations

Multiple regression was used to predict the readiness of cloud computing adoption by SMEs using national e-readiness and organisational preparedness as independent variables. The total variance explained by model is R squared is 48.9% (F= 2.46) = 7.243, p= 0.02< 0.05 level of significance and this confirms the fitness of the model. There is a linear relationship between dependent and independent variables. The constant or intercept = 5.213 and is not significant since p value = 0.121 > p= 0.05 level of significance.

The regression co-efficient of national e-readiness is -3.707, which is not significant in the model since its p value = 0.089 and is greater than p= 0.05 level of significance. The relative co-efficient of organisational preparedness (OP) is 5.625 and significant in the model, since p value = 0.01, which is less than p=0.05 level of significance. This means that the regression equation is: cloud adoption readiness = 5.625 (OP).

4.4.8 T –Tests

1) Position in the organisation vs. cloud computing adoption

A t-test was carried out to determine if there was a significant difference between perception of managers and owners on readiness to adopt cloud computing. The following hypothesis was put forward:

There is a significant difference between perception of managers and owners on readiness to adopt cloud computing of their SMEs.

Table 4. 36: Group Statistics

Position What is your position in the company?		**N**	**Mean**	**Std. deviation**	**Std. error mean**
Cloud adoption Readiness of your organisation to adopt cloud computing.	1 Owner	38	8.5000	2.95690	.47967
	2 Manager	16	12.5000	4.69042	1.17260

Table 4. 37: Independent Samples Test

		Levene's test for equality of variances		t-test for equality of means						
									95% Confidence interval of the difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean difference	Std. error difference	Lower	Upper
Cloud adoption readiness of your organisation to adopt cloud computing	Equal variances assumed	11.895	.001	-3.786	52	.000	-4.00000	1.05649	-6.12001	-1.87999
	Equal variances not assumed			-3.157	20.211	.005	-4.00000	1.26692	-6.64098	-1.35902

As seen from the above tables, there is a significance difference between the perception of managers and owners on readiness on cloud computing adoption. Table 4.38 shows the mean for managers as 12.5000 and that of owners as 8.5000. Table 4.38has a p= 0.005, implying that the difference in means is statistically significance since p < 0.05 level of significance.

4.4.9 Levene's test for equality of variance

We are testing to see whether the variation of scores for two groups 'managers' and 'owners' is the same. The assumptions, according to Pallant (2013:212), are:

1) If significance value of Levene's test > 0.05, use the equal variance assumed (first line in the table).
2) If the value of Levene' test is < or equal to 0.05 use the equal variance not assumed (second line in the table).
3) It is also assumed that if significance value > 0.05 there is no significant difference between the groups and if the value < or == 0.05 then there is a significant difference between the groups.

Therefore, from the above table we use the equal variances not assumed because the significance value <0.05

Calculating the effect of size for independent-sample

We use the formula:

Eta squared (η^2) = $\frac{t^2}{t^2+(N1+N2-2)}$

$$= \frac{-3.157^2}{-3.157^2+(38+16-2)}$$

$$= \frac{9.966649}{9.966649+52}$$

$$= \frac{9.966649}{61.966649}$$

$$= 0.16083892$$

Cohen (1988:284) provided guideline to interpret the results:

.01 = small effect

.06 =medium effect

.14 = large effect

The result above implies that there is a large effect.

4.4.9.1 T-Test: Gender vs. cloud adoption readiness

Table 4. 38: Group statistics for gender and cloud computing

Gender What is your gender?		N	Mean	Std. Deviation	Std. Error Mean
Cloud_Adoption Readiness of your organisation to adopt cloud computing	1 Male	33	9.8788	3.83860	.66821
	2 Female	21	9.3810	4.23646	.92447

Table 4. 39: Independent Samples Test for Gender vs. Cloud Adoption

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Cloud_Adoption Readiness of your organisation to adopt cloud computing	Equal variances assumed	.115	.736	.446	52	.657	.49784	1.11555	-1.74068	2.73635
	Equal variances not assumed			.436	39.601	.665	.49784	1.14068	-1.80830	2.80397

As can be inferred from Table 4.39, the mean for male is 9.8788 and that of female is 9.3810. The means show that there is no significant difference in Readiness to adopt Cloud Computing between the two genders. Levene's Test for equality of variances show that equal variance assumed has a value of 0.446, which is > 0.05, and this means that there is no significance difference between males and females when it comes to readiness to adopt cloud computing.

4.5 CHAPTER SUMMARY

The chapter reported on several statistics and analysis on the data. The chapter analysed the findings of data collected during the survey. Factors that affect cloud adoption and readiness of SMEs in Bulawayo to adopt cloud computing were highlighted. The results of analysis were presented as descriptive and statistical analyses. Excel was used to generate graphs and pie-charts, while SPSS was used to generate tables and inferential statistics. The next chapter is dedicated to discussion of the findings.

CHAPTER 5:
DISCUSSION OF RESEARCH FINDINGS

This chapter focuses on the discussions of research findings. The discussions are divided into two sections. The first section discusses the first objective of the research, which was to explore the state of readiness of SMEs in Bulawayo to migrate to cloud computing. The second section discusses the second objective, which was to investigate factors that affect cloud computing adoption by SMEs in Bulawayo.

The first section discussions focus on findings from inferential statistics while the second section focuses on findings from descriptive statistics.

5.1 INFERENTIAL STATISTICS

This section discusses the finding from inferential statistics based on first objective, which is to assess or to explore the state of readiness of SMEs in Bulawayo to migrate to cloud computing.

After using multiple regressions to predict cloud computing adoption readiness by SMEs in Bulawayo the following equation was derived:

Cloud Adoption Readiness = 5.625 (OP).

OP stands for organisational preparedness. This means that the most important factor affecting cloud computing adoption by SMEs is organisational preparedness. Surprisingly, National e-readiness has been found insignificant.

5.1.1 Owner/ Manager Perception

T-tests of position and adoption revealed a big mean difference between managers and owners. Surprisingly, 38 owners had a mean of 8.4, while only 16 managers had a mean of 12.00. This reveals that owners are more reluctant to adopt cloud computing, while managers are in favour. Interestingly, the findings are not different from other research findings. The total commitment of the owner has been found to be of paramount importance in cloud computing adoption. Low *et al.* (2011:1018) found that top management support was a significant discriminator between cloud adopters and non-adopters. This is because the owner has full control of the organisation's financial and human resources (Elbeltagi *et al.*,2013:27). Without the support from top management,

there will be resistance from employees, which can become a barrier to adoption of the cloud (Aldmour and Elayan, 20012:166). The owner should lead from the front to show commitment.

5.1.2 Gender and Cloud computing adoption

The researcher found that there is no significant difference between men and women in the way they adopt cloud computing. Interestingly, the findings are similar to those of Aldhmour *et al.* (2012:168) as well as Dwivedi and Lal (2007:666), who concluded that there was no significant statistical difference between genders in-so-far as perception towards adoption of a new technology is concerned.

In contrast to these findings, some researchers found that gender affects adoption of a new technology. Hernandez *et al.* (2011:118) found that gender clearly affects an individual's decision process in the adoption of new technology. They found that men's focus on technology was more intense than that of women. The contrast in findings could be attributed to the differences in the level of Internet penetration between the two countries in which the researches were conducted. This research was conducted in Bulawayo a city in Zimbabwe while Hernandez et al (2011) conducted their research in Spain a more developed country than Zimbabwe.

5.1.3 Educational qualification of the owner

The educational qualifications of the sample reveal that the majority 29 (53.7%) of the respondents have a Technical college qualification lower than the first degree. Studies have shown that educational level and IT experience of owner SME are significant predictors of how far can an SME adopt IT. However, in their studies of enablers and inhibitors of Advanced IT Adoption by SMEs, Kannabiran and Dharmalingam (2010:199) found that IT experience of the owner is not a significant factor influencing IT adoption.

5.1.4 IT Infrastructure

The findings show that 51 (94.4%) of the SMEs have access to an Internet connection, while 41 (77.8%) have standalone computers. The findings also show that 49 (90.7%) do not have IT departments, and that 44 (81.5%) of the customers are local. Meanwhile, 51 (94.4%) of SMEs prefer cash deposits as the method of payment. Kapurubandara and Lawson (2006:5) showed that lack of online payment processes directly inhibit adoption

of new technology. This shows that the SMEs in Bulawayo have basic office IT infrastructure, but lack necessary technology to enhance business processes. These findings agree with previous studies (Chinyanyu and Lorraine, 2011) in Kannabiran and Dharmalingam (2011:200) that show a lack of IT infrastructure such as poor communication infrastructure affects adoption of advanced IT. As many as 40(74.1%) of the SMEs do not have special software like ERP for their business processes to enhance their competitive advantage.

Kannabarian and Dharmalingam (2011:193) confirmed from their studies that poor ICTs infrastructure and lack of ICT technical and managerial capacity are obstacles to SMEs in adopting advanced ICT to enhance their business processes. In contrast to those findings, Alshamaila *et al.* (2013:265), in their study of cloud computing by SMEs in England, found that “ICT infrastructure was not a major obstacle for the adoption” of cloud computing.

5.1.5 Size of SME and years of operation

The findings show that 92.6% of the SMEs have between one and nine employees, and that 79.7% of the SMEs are less than five years old. These findings show that the SMEs in Bulawayo are both small and young. Previous studies show that size of an SME is an important factor in determining adoption of cloud computing. Kannabirian and Dharmalingam (2010:193) suggest that SMEs with fewer than 10 employees were less likely to adopt advanced IT than larger SMEs. Li (2011), in Kannabiran and Dharmalingam (2010:192), found that Chinese SMEs failed to attempt to adopt ERP due to their small-scale operation. The smaller the firm size the lesser the information interaction (Kannabiran and Dharmalingam, 2010:200), hence are less likely to adopt cloud computing.

However, some studies by Alshamaila and Papagiannidis (2012:262) suggest that by being small, the SMEs are flexible enough to take up any advanced IT without bureaucratic procedures found in big organisations. Their findings show that it is an advantage to be small, because the small organisation is flexible to quickly adopt and adapt to any situation.

5.2 FACTORS AFFECTING CLOUD ADOPTION BY SMEs IN BULAWAYO

This section discusses the research findings on the factors that affect cloud computing adoption by SMEs in Bulawayo.

5.2.1 National E-Readiness

This is the availability of the necessary national IT infrastructure that encourage SMEs to migrate to the cloud. Table 4.7 highlights seven factors that affect cloud computing adoption by SMEs in Bulawayo: power failure; an undeveloped on-line payment system; lack of government policies; and lack of cloud services providers in the country; have been seen as the major hindrances to full-scale cloud computing adoption by SMEs.

5.2.1.1 Power failure and inadequate electricity supply

Power failure and inadequate electricity supply have been cited as key factors that affect cloud computing adoption. The findings show that 92.6% (N=50) of the respondents agreed that currently lack of adequate electricity was a major challenge for them to embrace cloud computing. The findings are similar to those by Abubakar *et al*. (2014:9) and Ojukwu (2006:54), who found that electricity is highly unreliable in many parts of Africa, especially Sub-Sahara, which makes it hard for SMEs to adopt to cloud computing.

5.2.1.2Lack of government regulation

The findings also show that 87.1% (N=47) of the respondents believe that lack of government regulation was a major setback to cloud adoption by the SMEs. They believe the government has not committed itself enough to put in place enabling environment to encourage SMEs to adopt cloud computing. The findings are similar to those by Le Roux and Evans (2011) in Abubakar *et al.* (2014:2), who cited lack of political will and determination by government to create an enabling environment to narrow the digital divide is a barrier to adoption of new technology. The government should provide suitable infrastructure and policies and regulations aimed at encouraging SMEs to adopt the cloud (Elbeltagi *et al*., 2013:40).

5.2.1.3 Lack of cloud service providers

The findings also show that majority of respondents 55.6% (N=30) agree and 42.6% (N=23) strongly agree that there are no cloud service providers in the country. If we add

the two, we reach a massive 98.2% of respondents who think that there are no cloud service providers in the country. This could be lack of awareness. If there are policies and enough awareness, then everyone would be aware of cloud computing service providers. Availability of cloud service providers has been cited in many studies as a key factor to cloud adoption. Yeboah-Boateng and Essandoh (2014:17), in their research to find factors that affect adoption of the cloud by SMEs in developing economies, conclude that availability of competent cloud vendors is an important factor to encourage SMEs to adopt cloud computing. To increase adoption, the service provider should work hard to promote the products and services (Koehler *et al.* 2010:8).

5.2.1.4 Low Internet penetration in businesses

The findings show that low Internet penetration in businesses as one of the factors that affect Cloud Computing in Bulawayo. Sixty-three percent (N=34) agree and 29.6% (N=16) strongly agree that low Internet penetration has affected the rate of cloud computing adoption. Very few businesses use the Internet to conduct their business transactions. Table 4.22 shows that only 7.4% (N=4) of the SMEs use the Internet to do e-purchasing and e-payments, while 16.7% (N=9) use the Internet to do e-commerce. Some studies by Kapurubandara and Lawson (2006:5), Manuere *et al*. (2012:1147), Ashrafi and Murtaza (2008:133) and Yeboah-Boateng and Essandoh (2014:16) confirm that low computer and Internet penetration and undeveloped state of Internet service providers hinder cloud adoption by SMEs.

5.2.2 People factors

The research findings show that people within the organisation can propel or can be a barrier to cloud computing adoption. The findings show that 85.2% (N=46) of the respondents agree that lack of IT skill within an organisation hinders cloud computing adoption. Again, 85.2% (N=46) agree that that illiteracy of customers in cloud computing decelerates cloud computing by SMEs. The findings are consistent with those by Alam and Noor (2009:115), who found that employees of SMEs tend to lack skills and expertise to use IT in their businesses, and that this negatively affects cloud computing adoption rate. Ashraf and Murtaza (2008:133), Yeboah-Boateng and Essandoh (2014:16), Ogunyemi and Johnson (2012:105) and Makena (2013:519) cite the lack of necessary internal skills as a major barrier to cloud computing adoption. If people lack the necessary skills, they resist any new innovation, because they fear the unknown. Kapurubandara and Lawson (2006:5) identified computer illiteracy and lack of skills

needed in order to use the Internet among consumers as a major hindrance to cloud computing adoption.

5.3 SUMMARY OF THE CHAPTER

The chapter discussed findings of the research. Both descriptive and inferential statistics were used to discuss the findings. The findings show that national e-readiness and people factors act as hindrance to cloud computing adoption by SMEs in Bulawayo.

Organisational factors have been found to have the most effect on cloud computing adoption by SMEs in Bulawayo. Owner/manager perception, IT infrastructure of the organisation, size of organisation, and number of years SME has been operating, have been found to be profound factors that affect cloud computing adoption. The findings show that gender has no effect on cloud adoption. The findings also show that the few SMEs sampled show that they are not ready to implement cloud computing as a business strategy.

CHAPTER 6:
SUMMARY OF THE RESEARCH FINDINGS

The aim of the study was to explore cloud computing adoption by SMEs in Bulawayo. The study used NOIIE as its framework. To achieve the above mentioned aim the study had the following objectives:

a) to assess the state of readiness of SMEs in Bulawayo to migrate to cloud computing; and
b) to investigate factors that affect cloud computing adoption by SMEs in Bulawayo.

6.1 SUMMARY OF FINDINGS

Survey methodology was used. Questionnaires were distributed to 60 sampled SMEs. 54 questionnaires were finally analysed, six could not be retrieved from the respondents.

Through descriptive analysis of cloud computing adoption by SMEs in Bulawayo, the findings show that SMEs still have serious challenges to adopt. The national e-readiness challenges cited include: power failure, lack of clear government policies, lack of cloud service providers in the country, and undeveloped on-line payment system in the country.

Result of Kaiser-Meyer-Olkin and Bartlett's Sphericity showed that the data was suitable for factor analysis. The Cronbach coefficient was used to check reliability of the research instrument. Regression analysis showed that organisational preparedness is the most important factor that affects cloud computing adoption by SMEs.

Top management championship has been found as one of the most important factors that can affect cloud computing adoption by SMEs. If top management is not willing or is not aware of cloud computing, then the SME would not adopt cloud computing. Other organisational factors that affect SMEs include: size of SMEs and the number the SME has been in operation. This has to do with maturation of businesses processes and IT

infrastructure. Young businesses do not have mature business processes that can be integrated with the cloud. Worse still, the IT infrastructure is still basic to migrate to the cloud. Level of education of the top management has been found to be crucial for the SMEs to adopt cloud computing. The more educated the owner or manager is, the more likely the SME would be to migrate to the cloud.

6.2 IMPLICATIONS OF THE RESEARCH

There is limited empirical research on cloud computing adoption by SMEs in Zimbabwe. This is probably one of the few studies that have been done for SMEs in Zimbabwe. While the findings of this research cannot be generalised to other SMEs in other parts of the country, they however have practical implications for government, vendors, top management and employees in SMEs that want to migrate to the cloud.

6.2.1The government

The findings show that there is barely enough cloud infrastructure in the country. This should be the responsibility of the government to introduce the necessary policies to entice or better still to partner with cloud service providers to implement the necessary infrastructure, incentivise SMEs and encourage them to adopt cloud computing.

6.2.2 Vendors

The cloud service providers should work hard to promote their products. They should try to customise their products to suit a wide range SMEs. This could help to increase cloud computing adoption by SMEs. The same goes for the Internet service providers. They should make Internet services affordable, and improve bandwidth to handle many users the same time.

6.2.3 Top Management (Owner/ Manager)

Top management championship is one of the organisational factors that have been found to be very important in cloud computing adoption by SMEs. The top management must be aware of this technology and be willing to commit resources towards its adoption. If an SME is led by an owner or manager who lacks basic IT knowledge and awareness, then it will miss out on the benefits its business could gain from ICT adoption (Elbeltagietal, 2013:30). The management should also involve the employees so that

they are also in the know. This is important to avoid employee resistance when the time comes to adopt cloud computing.

6.3 FUTURE RESEARCH

1. The NOIIE framework is still a relatively young framework. The same study should be carried out using other mature frameworks and see if they can come to the same conclusion.
2. The SMEs are diverse in terms of their business operations, and therefore, it may not be correct to generalise these findings to all SMEs. Future studies should carefully sample SMEs in the same line of business and explore how they adopt cloud computing as a business strategy.
3. In future, a qualitative method should also be used to supplement quantitative method. This could give a richer picture on adoption patterns of the SMEs. The Sample should also be bigger than the research sample to cover as many SMEs as possible.

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APPENDICES

APPENDIX – A

APPENDIX- A

CONSENT LETTER

Consent Form

Research Participant's Permission

Signature to confirm participation in research study I, **Richard Shoniwa** hereby state that I will not use the information provided in this questionnaire for any other purpose other than the stated purpose, that being for use during analysis and discussion of findings. I will respect the information with strict confidentiality and anonymity.

_____ _____

Signature Date

I hereby voluntarily give my permission to participate in this research study as explained to me by the researcher, **Richard Shoniwa**. The nature, objective, confidentiality and publication of information have been explained to me and I understand them.

_____ _____

Signature of Participant Date

For any queries, please contact **Richard Shoniwa** at:
rtshoniwa@gmail.com; 49129872@mylife.unisa.ac.za
+263 772 370908 or +27 73 211 3897

APPENDIX- B

QUESTIONNAIRE

QUESTIONNAIRE – Introductory note

Dear Respondent

My name is **Richard Shoniwa** and I am a Master of Science student at the University of South Africa. I am carrying out an academic survey which is aimed at investigating the state of preparedness of small to medium enterprises (SMEs) in Bulawayo to adopt cloud computing as a business strategy.

As an owner/manager or an employee of SMEs, it's important to know your valuable insights and views about how ready you are to adopt cloud computing in your organisation. The results of this research will produce invaluable information to individual SMEs owners like you, the city council, the government, and also to researchers. The results will give an insight into how ready SMEs are to adopt cloud computing. This will help the government to put in necessary frame to encourage SMEs to migrate to the cloud or to intensify what is already on the ground to encourage SMEs in this region to compete favourably with other SMEs in different regions of to world for the global market.

Your participation is therefore very important to yield this valuable information. I want to assure you that your responses will be kept strictly confidential and will only be used for the purpose of this research. Names of SMEs will be used in data analysis and will not be published in the research. No names of individuals should be written on the questionnaire. **Your participation is voluntary and you may, however decide not to participate or stop participating at any time without negative consequences and also note that there is no financial or material gain by participating in this research.**

I will be grateful is this questionnaire is fully completed and be ready for collection by 31/10/2014.

Thank you so much for your invaluable participation.

Yours faithfully

Richard Shoniwa

THE QUESTIONNAIRE

Instructions

- Answer all questions.
- For each question read all answers first and indicate your answer by putting an X on your chosen answer.
- Where you need to fill in, please write legibly.
- Your responses are confidential and no name of SME or owner will be published therefore, please kindly give your honest answer.

SECTION A: GENERAL INFORMATION. (Please fill in with an X in the appropriate box)

1. Name of organisation.....(*Optional/ you may leave it blank*)

2. What is your gender? Male ☐ Female ☐

3. What is your position in the company?
   Owner ☐
   Manager ☐

   Other, (specify).....

4. What is your level of education?

Primary school	
Secondary school	
Technical college	
First Degree/ Bachelors	
Masters degrees	
Doctoral degree	
Other	

If other, please write the details here: _____

5. What is your type of business?

Communication	
Construction	
Farming	
Pharmaceuticals	
Textile & Clothing	
Grocery/ Food processing	
Chemical/ Electrical products	
Manufacturing	
Carpentry & Wood curving	
Finance	
Transport	
IT	
Other (specify)	

6. How many employees to you have?

1-9	
10-20	
21-50	
51-100	
Over 100	

7. How many years has your enterprise been in business?

>20 years	
16-20	
11-15	
6-10	
1-5	
< 1 year	

SECTION B: BENEFITS OF CLOUD COMPUTING TO A SMALL TO MEDIUM ORGANISATION.

1. Which of the following activities are the most important benefits of Cloud computing on your business?

   Please rate by indicating [X] whether you (1) [SD] Strongly Disagree; (2) [D] Disagree; (3) [N] Neutral; (4) [A] Agree and (5) [SA] Strongly Agree

Benefits	1	2	3	4	5
	SD	D	N	A	SA
a) Reduces cost of doing business					
b) Gives access to buying products at best prices					
c) Facilitates fast delivering products online e.g. e-catalogue, e-books, software, etc and for providing after sales service					
d) Employee can telecommute or work from remote locations					
e) Reduces initial investment costs (capital costs) to buy IT infrastructure					
f) Operational costs will decrease with adopting cloud computing					
g) Allows flexible payments (pay-as-you-use) without need to own IT infrastructure					
h) Company and customer data are more secure on the cloud					
i) Removes the need of a stand- alone IT department in the organisation					
j) There is better integration of different departments in the organisation					
k) Saves company money on software licence fees					
l) Businesses do not have to worry about upgrading their applications whenever there is a new version on the market					
m) Serves as a platform for inexpensive advertising					
n) Brings competitive advantage to firms					
o) Improves collaboration among SMEs					
p) Ensures access to the global market					
q) Enhances networking with other companies					

Please state any other benefits.....

SECTION C: BARRIERS TO CLOUD COMPUTING ADOPTION

1. Which of the following barriers could your company face (or has faced) in adopting Cloud Computing?
   Please rate by indicating [X] whether you (1) [SD] Strongly Disagree; (2) [D] Disagree; (3) [N] Neutral; (4) [A] Agree and (5) [SA] Strongly Agree

	1	2	3	4	5
	SD	D	N	A	SA
a) Lack of knowledge on cloud computing					
b) Power failure and lack of adequate electricity supply					
c) Undeveloped online payment systems					
d) Lack of information and popularity on online sale and products marketing					
e) Few businesses use internet (low internet penetration in the country)					
f) Little support and lack of deliberate policies for SMEs from government to encourage SMEs to adopt cloud computing					
g) Uncertainty about retains on investments					
h) Inadequate legal framework for business to use the cloud					
i) Lack of cloud service providers in the country					
j) Poor security systems to check internet fraud and privacy issues					
k) Lack of technological experts (skill) to handle the computer systems					
l) Lack of IT skill in the organisation					
m) Low trust for online payment (use of credit/debit cards)					
n) Customers' unwillingness to accept internet/e-commerce business transactions					
o) Unsuitable economic environment					
p) Lack of telecommunication infrastructure					
q) Illiteracy of customers in computing/internet					
r) Too complex to implement					
s) Low management commitment to cloud computing					

SECTION D: FACTORS AFFECTING CLOUD COMPUTING ADOPTION BY SMES IN BULAWAYO.

1. Which of the following factors affect cloud computing adoption by SMEs in Bulawayo?
   Please rate by indicating [X] whether you (1) [SD] Strongly Disagree; (2) [D] Disagree; (3) [N] Neutral; (4) [A] Agree and (5) [SA] Strongly Agree.

Factors	1	2	3	4	5
	SD	D	N	A	SA
a) Lack of knowledge on cloud computing					
b) High set up cost					
c) Power failure and lack of adequate electricity supply					
d) Undeveloped online payment systems					
e) Lack of information and popularity on online sale and products marketing					
f) Few businesses use internet (low internet penetration in the country)					
g) Government regulation					
h) Uncertainty about retains on investments					

	1	2	3	4	5
	SD	D	N	A	SA
i) Inadequate legal framework for business to use the cloud					
j) Lack of cloud service providers in the country					
k) Poor security systems to check internet fraud and privacy issues					
l) Lack of technological experts (skill) to handle the computer systems					
m) Expensive internet connections and usage					
n) Lack of IT skill in the organisation					
o) Low trust for online payment (use of credit/debit cards)					
p) Customers' unwillingness to accept internet business transactions					
q) Unsuitable economic environment					
r) Lack of telecommunication infrastructure					
s) Illiteracy of customers in computing/internet					
t) Too complex to implement					
u) Low management commitment to cloud computing					

Please state any other challenges .....

.....

The following section is asking you questions on how ready your organisation is to adopt cloud computing.

SECTION E: READINESS OF YOUR ORGANISATION TO ADOPT CLOUD COMPUTING.

Part 1: Organisational IT Information

1. Do you have a stand-alone IT department? ☐ Yes ☐ No
2. Do you outsource some IT functions? ☐ Yes ☐ No
3. If yes, which functions do you normally outsource?
   .....
   .....
4. Do you have an IT system or a special software package that you use in your business (e.g. an account system, management system) etc?
   Yes ☐ No ☐
5. If yes, who maintains it?.....
6. Are you connected to the Internet? Yes ☐ No ☐

7. If yes, how do you access the nternet?

Dial up	☐
ISDN	☐
Wi-Fi	☐
xDSL	☐

8. Are computers networked? Yes ☐ No ☐

9. If yes, what type of network?

Intranet ☐ extranet ☐ I don't know ☐

10. Do you have a company web address?

Yes ☐ No ☐

11. What do you use the Internet for?

General information search	☐
Provide information about company's product, services	☐
Order exchange with suppliers and customers	☐
E-purchasing and E-payments	☐
Records (collection, analysis and reporting of data)	☐
Receiving customer's feedback	☐
E-commerce	☐
Other, specify	☐

.....

12. What type of customers do you deal with? (Put [X] where appropriate)

Local (Bulawayo)	☐
National	☐
Regional	☐
International	☐

13. What type of suppliers do you deal with? (Put [X] where appropriate)

Local (Bulawayo)	☐
National	☐
Regional	☐
International	☐

14. How does your company pay suppliers? (Put [X] where appropriate).

Bank Cash Deposits	☐
Bank transfers	☐
Cheque	☐
E-payments	☐

15. How do your customers pay for services rendered to them? (Put [X] where appropriate).

Cash deposits	☐
Bank transfers	☐
Cheque	☐
E-payments	☐

Part 2: ORGANISATIONAL READINESS

16. Please rate the extent to which your organisation is ready to adopt cloud computing as a business strategy. Rate by indicating [X] whether you (1) [SD] Strongly Disagree; (2) [D] Disagree; (3) [N] Neutral; (4) [A] Agree and (5) [SA] Strongly Agree

	1	2	3	4	5
	SD	D	N	A	SA
a) Our organisation is aware of Cloud computing implementations in our partner organisations					
b) Our organisation recognises the opportunities and challenges enabled by Cloud computing					
c) Our organisation understands Cloud computing business models that can be applicable to our organisation					
d) We are aware of the potential benefits of Cloud computing to our organisation					
e) Our organisation has a clear vision for Cloud computing					
f) Our vision of Cloud computing activities is widely communicated and understood throughout our company					
g) Roles, responsibilities and accountability are clearly defined within each Cloud computing initiative					
h) We have enough technical skills (human capacity) to deploy and implement the cloud					
i) We have considered/evaluated the impact of Cloud computing to the way our sector operates					
j) We have sufficient internet bandwidth to utilise Cloud computing					
k) Our organisation is well connected to a Local Area Network (LAN) and a Wide Area Network (WAN)					
l) We can afford high bandwidth connectivity to the Internet					
m) The telecommunications infrastructure is reliable and efficient to support Cloud computing.					
n) We have thoroughly analysed the possible changes required to take effect in our organisation, suppliers, partners, and customers as a result of each Cloud computing implementation					
o) We believe that our customers are ready to do business on a Cloud computing environment					
p) Our organisation is aware of competitor's Cloud computing utilisation					
q) Our organisation partners and/or customers are capable of supporting Cloud computing transactions					
r) We feel that company data and transactions with employees online can be executed safely using Cloud Computing					
s) We believe that there are effective laws to protect our privacy and our customer privacy on the cloud					
t) Our organisation partners and/or customers are capable of supporting Cloud computing transactions					
u) We believe that there are effective laws to protect our privacy and our customer privacy on the cloud					
v) The government demonstrates strong commitment to promote Cloud Computing					

	1	2	3	4	5
	SD	D	N	A	SA
w) There is a supporting policy framework for SMEs to migrate to Cloud Computing					
x) The existing policy framework for Cloud Computing is comprehensive					
y) The existing legal framework for Cloud Computing is comprehensive					
z) The presence of well known cloud Computing vendors in the cloud market increases our confidence in Cloud Computing adoption					
aa) Cloud Services Providers (CSP) offer better security services than currently available in our organisation.					
bb) Cloud Computing results in security enhancement.					
cc) We are uncertain about the Cloud computing market and Cloud computing providers services - prices might increase and technical expertise change					
dd) We feel that there is efficient and affordable support from the local IT industry to support move to Cloud computing					

Thank you so much for taking your time to complete this questionnaire. I wish to assure you once again that the information that you supplied us with will be used for intended purpose only and will be treated with strictest confidentiality.

THE END

APPENDIX- C

ETHICAL CLEARANCE

UNISA college of science, engineering and technology

Mr Richard Tawanda Shoniwa (49129872) 2014-05-14

College of Science, Engineering and Technology

UNISA

Johannesburg

Permission to conduct research project

Ref: 129/RTS/2014

The request for ethical approval for your MSc (Computing) research project entitled "Assessing the readiness of small and medium enterprises (SMEs) in Bulawayo to adopt cloud computing as a business strategy" refers.

The College of Science, Engineering and Technology's (CSET) Research and Ethics Committee (CREC) has considered the relevant parts of the studies relating to the abovementioned research project and research methodology and is pleased to inform you that ethical clearance is granted for your study as set out in your proposal and application for ethical clearance.

Therefore, involved parties may also consider ethics approval as granted. However, the permission granted must not be misconstrued as constituting an instruction from the CSET Executive or the CSET CREC that sampled interviewees (if applicable) are compelled to take part in the research project. All interviewees retain their individual right to decide whether to participate or not.

We trust that the research will be undertaken in a manner that is respectful of the rights and integrity of those who volunteer to participate, as stipulated in the UNISA Research Ethics policy. The policy can be found at the following URL:

http://cm.unisa.ac.za/contents/departments/res_policies/docs/ResearchEthicsPolicy_apprvCounc_21Sept07.pdf

Please note that if you subsequently do a follow-up study that requires the use of a different research instrument, you will have to submit an addendum to this application, explaining the purpose of the followup study and attach the new instrument along with a comprehensive information document and consent form.

Yours sincerely

Deputy Chair: College of Science, Engineering and Technology Ethics Sub-Committee

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