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# **Gordon Institute of Business Science**

## University of Pretoria

### **ICT Infrastructure investment and the level of ICT maturity in SME's in Africa**

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A research project submitted to the Gordon Institute of Business Science, University of Pretoria, in partial fulfilment of the requirements for the degree of Master of Business Administration.

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## ABSTRACT

**Purpose:** The aim of the study was establish if increased information and communication technology (ICT) infrastructure investment at the macro level improves the micro level ICT Maturity level within small and medium enterprises (SME's in Africa. The research further established if urban SME's benefit more than rural SME's in terms of ICT maturity level if there has been increased ICT infrastructure investment.

**Methods:** The study makes use of factor analysis to compose a composite index that measures the ICT maturity levels within SME's in Africa. Further to this it uses that composite index to do statistical tests on the means of samples to answer hypothesis based on the research questions posed.

**Results:** The study finds that there is a significant difference in the ICT maturity level of small and medium businesses in African countries where there has been and increased level of ICT infrastructure investment. Furthermore the study finds that in those African countries where there has been increased ICT infrastructure investment urban SME's have higher ICT maturity level than rural SME's.

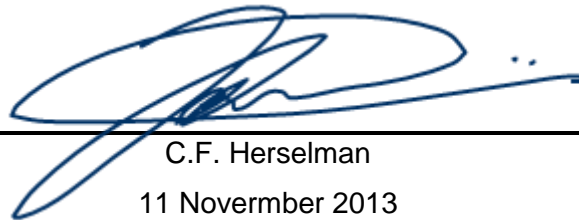
**Conclusion:** This study has important implications for governmental as well as private sector policy relating to ICT infrastructure investment. The study further also empirically could guide ICT investment towards rural SME's as a means of improving economic benefit from ICT.

## KEYWORDS

ICT Maturity, Developing Countries, ICT Infrastructure Investment, Small and Medium Enterprises, Africa

## DECLARATION

I declare that this research project is my own work. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted before for any degree or examination in any other University. I further declare that I have obtained the necessary authorisation and consent to carry out this research.



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C.F. Herselman  
11 November 2013

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I would like to acknowledge my wife who has stood by me through difficult times; this has truly been a testing period in our lives. Words cannot express my gratitude to you.

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# 1. RESEARCH PROBLEM

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Historically, the lack of financing for information and communication technology (ICT) infrastructure expansion has been a challenge for developing nations. Sources of capital have been constrained and the decision to invest in social or technology infrastructure has been difficult. Resource scarcity has meant that ICT infrastructure in developing nations, has lagged that of the developed world and thus the existence of the digital divide (Teltscher, et al., 2012).

The developed world has had a long history of infrastructural investment and development (Bollou & Ngwenyama, 2008). The growth of Information and communication technology (ICT) in the developed world has followed in much the same trajectory with incremental development and investment over time.

In contrast, the developing world has not had the same amount of time or scale of investment in its infrastructure as has the developed world and by extension the ICT infrastructure in many developing economies has not grown in the same incremental manner.

As of late ICT infrastructure investment has been hailed as an important driver into lifting developing nations out of poverty (Bollou & Ngwenyama, 2008). As a result of this a number of African countries have spent significant amounts of the fiscal budget on ICT infrastructure investment. However, despite this investment, Kwaku Kyem (2012) has bemoaned the fact that the economic benefits from ICT infrastructure investment are not being realised in sub-Saharan Africa. This phenomenon was studied by Ballou et al. in their 2008 study to examine whether this investment into the ICT sector was paying off. These authors went on to express the lack of research and study into understanding the effectiveness and efficiency of ICT infrastructure investment as a whole.

In their study of ICT productivity in developing countries (Commander, Harrison, & Menezes-Filho, 2011) maintain that evidence of ICT adoption and the consequences thereof in developing countries remain scant.

Developing countries are said to be able to leapfrog developed countries in ICT infrastructure because they do not need to incrementally replace older technologies but can rather invest in the latest technology infrastructure (Chircu & Mahajan, 2009).

International bodies have been promoting the investment in Information and Communication Technology (ICT) infrastructure as being essential to poverty alleviation and socio-economic reform. (Ngwenyama & Morawczynski, 2009).

A study by Vodafone in 2009, showed that mobile telephony diffusion and penetration has a positive correlation with economic growth. Furthermore, this might be twice as prolific in developing countries.

Government and private sector ICT and mobile telecommunication technologies in Africa has opened new and more mature channels to use ICT which is indicative of a greater level of maturity in business.

In this research report it is investigated whether indeed there are benefits from increased ICT infrastructure investment on the ICT maturity levels in small and medium businesses in Africa.

## **RESEARCH SCOPE**

This research is limited to twelve African countries where SME's (Small and medium sized business) have been surveyed both at an urban and rural level.

The research will be applied to all business where the full survey has been answered and thus a full ICT Maturity Level index can be compiled.

## **RESEARCH MOTIVATION AND VALUE**

Whilst Ballou *et al.* focussed their study on the total productivity of the ICT sector in West African countries; this research report focuses on the effectiveness of investment in ICT infrastructure in creating an enabling environment for mature ICT businesses.

In this report the relationship between investment in ICT infrastructure and the level of maturity of ICT use in business in Africa is investigated. Based on the research of Pham (2010) SME ICT maturity model, an ICT maturity level index is constructed.

By using statistical techniques the significance of greater ICT infrastructure investment on the ICT maturity level within SME's in Africa, is investigated.

Furthermore (Bollou & Ngwenyama, 2008) state that there is little research measuring the impact of ICT expansion in developing countries.

By understanding the relationship between ICT infrastructure investment and the maturity of ICT use in business in Africa, one can propose improved investment policy decisions.

This will specifically aid in effectiveness of ICT governmental investment policies.

Furthermore by considering how ICT infrastructure investment affects differing ICT use levels and their varying levels of maturity one is able to apply ICT investment decisions more comprehensively.

## 2. LITERATURE REVIEW

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To determine if greater investment in ICT infrastructure improves business ICT maturity level, a review of the drivers of the ICT infrastructure investment was put forward.

The literature review contextualises issues relating to Africa, encapsulating them by reviewing digital divide theory base and followed by ICT adoption and diffusion theory.

Lastly, ICT maturity models were investigated to understand their constructs and how they can be applied to business in Africa.

### **DIGITAL DIVIDE**

There has been extensive research on the difference between developed and developing countries in their ICT usage and access.

The term the “digital divide”, defined as the gap between business, individuals and household in access and usage of information and communication technologies, has been used to describe the growing disparity in the information society between developing and developed nations. (Dewan, Ganley, & Kraemer, 2005)

The term the “digital divide” was furthermore widely used as a proxy for internet access and use since this requires some form of ICT and the infrastructure to do so, this was especially relevant in the studies of mobile technology diffusion.

Furthermore, some have used the term and field to describe socio-economic differences which exist between developing and developed nations.

It is acknowledged that ICT infrastructure expansion has driven productivity and economic growth. Thus, advancement of a country is linked to ICT adoption/dissemination and utilisation. (Pick & Azari, 2008)

It is stated that half of the world has access to ICT, but this access is not uniform, for example Africa has the least amount (Doong & Ho, 2012) of access. Resources in ICT have not spread throughout the globe in an even way and to a large extent this is driven by the fiscal challenges of developing nations (Doong & Ho, 2012).

African countries have different developmental challenges to that of developed nations and ICT infrastructure investment must compete with other more pressing needs.

Wealthier nations have the fiscal means to exploit ICT investment to a greater extent because they do not face the same socio-economic challenges than their poorer counterparts.

Furthermore, developing countries might not see the same returns on their ICT investments than those of developed nations (Ngwenyama & Morawczynski, 2009)

### **Measuring the Divide**

There are numerous bodies who have attempted to measure the digital divide. The International Telecommunications Union (ITU) has proposed that the ICT Development Index (IDI) must measure the digital divide between countries. Some researchers argue that their index is not well suited to do so because it engages in alleged double counting and aggregation of independent and dependant variables (James, 2012).

Other researchers use clustering and statistical analysis of the United Nations ICT indicators to profile countries as either “leaders or “followers”. In their study of 192 UN member countries, Anyonso, Cho and Lertwachara (2010), outlined countries’ ICT infrastructure gap on both a regional and global basis. Although the digital divide is a broader topic than ICT Infrastructure the two concepts shares a close relationships. Their study is limited to five ICT indicators and thus might be too narrow in nature to propose policy. (Ayanso, Cho, & Lertwachara, 2010).

Azari and Pick (2009) used structural equation modelling to understand the interrelationships amongst four factors: socio economic, business and technology investment and governmental support on technology usage. They found that the direct influence of business and technology investment on technology use to be weak. In

contrast they found that the influence of governmental support and socio economic factors to have strong influence on technology usage (Azari & Pick, 2009).

Multivariate analysis tools are used in a study by Bruno, Esposito, Genovese and Gwebu (2011) to analyse existing composite indexes. Their study indicated that these indexes have inadequacies and that some of the variables used in them can be replaced with more relevant ones which could form a stronger relationship with the digital divide. Furthermore, their study focussed specifically on ICT Development Index (IDI) and Digital Access Index (DAI) (Bruno, Esposito, Genovese, & Gwebu, 2011).

### **Mobile technology and the Digital Divide**

In their study of mobile communication technologies in BRIC (Brazil, Russia, India and China), Chircu and Mahajan (2009) asked the question whether mobile ICT can bridge the digital divide. They found that the speed of mobile technology diffusion specifically in the BRIC countries surpassed those of developed nations, in some cases, depending on which indicator is used to measure and thus the BRIC study could be used as a model for other developing nations (Chircu & Mahajan, 2009).

This study is one of a growing area of research, suggesting the developing countries have the ability to “leapfrog” developed nations in terms of ICT infrastructure development.

However, perceptions about the digital divide vary; research into who is accountable for the digital divide was done by Epstein, Nisbet and Gillespie (2011). They found that by framing the questionnaire in different ways, they could alter perceptions of the sample with regard to who is responsible for the digital divide (Epstein, Nisbet, & Gillespie, 2011).

Some researchers are now concerned with the secondary digital divide, the so called democratic divide. Min (2010), in his study went on to research the secondary digital divide. This divide is concerned with who has access to the internet and their specific level of internet skills. Those who have higher skills and make use of the internet for socio-political purpose and those that have limited skills, are divided.

This research is now concerned with not who has access to ICT infrastructure but rather with what kind of purpose they use it for. Secondly, to what extent do they possess skills to influence online users for political or social purposes? As the internet is proliferated and penetration reaches saturations within the world, this will become the new democratic divide (Min, 2010).

James (2011) in his study to answer whether the digital divide is consistent with global equality or inequality used simple regression on developing countries. He found that, with a significant level of confidence, countries where the divide is narrowing, the income levels per citizen is increasing and the opposite is true for countries where the divide is widening. This finding answered his question whether the digital divide is consistent to global inequality, rather than equality (James, 2011).

Peter Blignaut (2009) studied the digital divide within South Africa and makes assertions that bridging the divide, is not merely about giving access to ICT and the internet. He argues that due to the increasing rate of technological change, bridging the divide has other dimensions such as age, gender, education and socio-economic status etcetera. He also argues that to bridge the divide, one needs to address these fundamental constructs in society to enable ICT usage and access sustainably (Blignaut, 2009).

## ICT ADOPTION AND DIFFUSION

Diffusion studies were first introduced in 1986 by Everett Rogers in his study called the Diffusion of Innovations, explaining the dissemination of technologies into society. There has been a proliferation of mobile communication in Africa. Total ICT worldwide spend has risen to US\$3.5 trillion in 2011.

ICT adoption studies largely focus around two themes, diffusion of technologies and behavioural perspectives. (Weber & Kauffman, 2011). Weber *et al* had grouped the ICT adoption factors into two broad categories namely economic and social. Yet they also state that there are multifaceted approaches to adoption studies and factors may vary depending on geography. Furthermore, factors that influence adoption of ICT do so at differing levels. They analysed trends that span over differing levels and, these levels, are individual, organisational, industry and country. (Weber & Kauffman, 2011).

Others have studied the broadening of the adoption factors from behavioural and attitudinal perspective, delving into the original psychological acceptance models namely Theory of Reasoned action, the Theory of Planned Behaviour and the Technology Acceptance Model. (Verdegem & DeMarez, 2011).

Contradicting many studies, Kwaku Kyem (Kwaku Kyem, 2012) argues that, although ICT infrastructure development might bridge the digital divide, in sub-Saharan African countries it also would immerse them prematurely into the global capitalist system, which will affect the country's ability for future development.



## **Technology diffusion as driver of economic growth**

The International Telecommunications Union (ITU) has long argued that ICT infrastructure investment and the technology diffusion as a result thereof, is a source of economic growth in developing countries.

In research analysing the ITU argument, ICT penetration and economic growth was investigated using regression. By doing a cross country analysis, Vu (2011) found that there exists a strong association between ICT penetration and economic growth in the period 1996 – 2005. Vu also determined that the marginal effect of internet user penetration on economic growth was greater than mobile phone penetration which in turn was greater than personal computer penetration (Vu, 2011).

In a related study by Sassi and Goaid (2013), they asserted that, theoretically, economic growth and ICT diffusion has a positive relationship but when empirically tested, it yields mixed results. Their research found a direct and positive effect between ICT proxies and economic growth. Their study was limited to the Middle East and North Africa (MENA) countries (Sassi & Goaid, 2013).

Kwaku Kyem continues to argue that, although ICT development and investment have raised the expectation of economic growth in the region, it is unlikely to do so. Cultivating indigenous technological innovation stemming from the ICT infrastructure investments is the key to adoption and returns on these investments.

In yet another study (Mamaghani, 2010) stated that the before developing countries can expect rapid ICT expansion and return on investment from it, they need to first have Social Institutions, good education levels, appropriate infrastructure and adequate investment capital.

Regardless of the theory base in which researchers phrase their adoption studies, they all commonly conclude that the determinants, specifically in developing nations, have been unreliable and further study is needed to understand it in greater depth.

## **ICT adoption in business**

Business level ICT adoption factors influencing adoption have been grouped into 5 categories (Spanos, 2002):

1. Environmental
2. Firm structural
3. Human capital
4. Competitive strategies
5. Internal organisation

In a study to identify the ICT adoption factors conducted in Spain, Spanos's model was used to regress factors and it was found that being part of a multinational organisation was the single greatest factor in influencing ICT adoption. (Bayo-Moriones & Lera-Lopez, 2007)

Jimoh, Pate and Schulman (2012) in their study regarding ICT adoption in health workers in Nigeria, found that there was no significant difference between age and gender in the adoption rate of workers. They also found that there was a significant difference in ease of use of ICT adoption factors (Jimoh, Pate, & Schulman, 2012).

## **Mobile technology diffusion**

Mobile technology diffusion has been a popular area of research in diffusion studies. Mobile technology diffusion has been linked with greater economic value being derived from its proliferation.

Mobile technology diffusion has also been hailed as the solution to bridging the digital divide due to the technology change rate being greater than the fixed ICT categories.

In a study of mobile phone diffusion in rural Malaysia as well as the policies that were put in place to increase the penetrations rate, Nair, Han, Lee, Goon and Muda (2012) found that the type of rural community, education, gender, encouragement and age are key determinants of the technology diffusion. (Nair, Han, Lee, Goon, & Muda, 2012)

In another mobile diffusion study a positive correlation to income inequality and the early rate of diffusion was found. This study was in line with a previous theory which asserts that the rich consume in early stage diffusion, but as diffusion becomes accessible to the lower income levels of the economy, diffusion rapidly accelerates. Although this study was limited to the early stages of mobile phone diffusion, it can be seen as a proxy for other technology diffusion where the income diffusion curve is similar (Hyytinen & Toivanen, 2011).

## ICT INFRASTRUCTURE AND ACCES

ICT infrastructure is asserted to be the growth accelerant of an economy. As such ICT infrastructure has been a significant part of country budgets. This is more prevalent in developing nations where they have a deficient infrastructure in comparison to developed nations. Developed countries already have sufficient and developed physical infrastructure to complement their ICT infrastructure.

In a study on ICT infrastructure by Holmner and Britz (2011) it was found that rail, road and other physical infrastructure projects and ICT infrastructure projects are correlated. Holmer *et al* found that Africa will only yield economic value from its ICT infrastructure if it invests aggressively, not only in ICT infrastructure, but also in other physical infrastructure that would complement ICT infrastructure (Holmner & Britz, 2011).

Sophisticated ICT infrastructure is needed to integrate ICT systems worldwide and shortened physical distances between trading partners. It has long been argued that aggressive investment in ICT infrastructure and deregulation is critical to socio-economic upliftment in developing countries. More so after a sustained period of aggressive investment and deregulation, some countries still have not realised this value.

In a study by Ngwenyama and Morawczynski (2009) it was found that deregulation on its own does not suffice. Ngwenyama *et al* also found that, for efficient ICT infrastructure expansion, other factors (economic, human capital, geography and civil infrastructure) should be considered. Policy makers will foster socio-economic development easier through ICT infrastructure investment, if these other factors are advanced (Ngwenyama & Morawczynski, 2009).

Research emanating from Oman scrutinised the construction industry in relation to the Oman vision 2020 ICT economic investment initiative, where it was found that the lack of ICT strategic thinking and short-term cost concerns were the greatest barriers to dynamic expansion (Alkalbani, Rezgui, Vorakulpipat, & Wilson, 2013).

Brown and Thompson (2011) identified four main themes in their study of the Jamaican government ICT infrastructure expansion initiative. Primarily, these themes drive the policy for future ICT infrastructure expansion and combine technology diffusion and ICT infrastructure expansion research areas. They also identified infrastructure and access, e-government efficiency, economic development and e-business as the four main themes (Brown & Thompson, 2011).

In a study aimed at evaluating the effects of the recent global financial crises on the ICT infrastructure investment sector, it was found that, in line with other sectors, the growth of this sector slowed down. More specifically it was found that the slowdown was greater in selective ICT markets, indicating that some ICT markets are seen as growth drivers in a depressed economy. It further made recommendations that innovative ICT investment can drive down fixed cost components in business budget cycles (Rojko, Lesjak, & Vehovar, 2011).

Other research has investigated a depressed observation to the realisation of ICT value in sub-Saharan Africa. Kwaku Kyem (2012) states, that notwithstanding mobile communication diffusion in sub-Saharan Africa, most other ICT developments are far from realising the benefits. He argues that the clash between rationality for development as well as the failure to cultivate a supportive environment for technological innovation within the region is the greatest barriers to realising economic benefit from ICT investment (Kwaku Kyem, 2012).

E-learning is a technology that can liberate education from the lower income populous. An Iranian study found the greatest barrier to e-learning liberation within developing countries is the lack of adequate ICT infrastructure. Further to this, they found that lack of process focus, implementation expertise, technology focus, open-source technology and lack of on-time funding created barriers in conjunction with ICT infrastructure matters (Omidinia, Masrom, & Selamat, 2011).

Mamaghani (2010) in his study into the economic benefits of ICT infrastructure expansion, found a positive correlation between economic growth and ICT investment. He found that for a developing country to realise the economic benefits associated with ICT infrastructure investment, the country must do so in parallel with education investment (Mamaghani, 2010).

Related to the Mamghani study, a study making use of a manufacturing firm's data in India and Brazil found a positive correlation between ICT capital and productivity. The study affirmed that poorer ICT infrastructure quality was associated with lower levels of ICT diffusion. It was also found that poorer quality ICT infrastructure was associated with a lower level of return on ICT investment (Commander, Harrison, & Menezes-Filho, 2011).

In a comparative study of developed countries, the researcher juxtaposed Japanese ICT infrastructure and usage against Denmark ICT infrastructure and usage. In this study it was found that institutions, technologies and services offered on the infrastructure, promoted a greater usage of ICT (Igari, 2013).

A healthcare study by Commander, Harrison and Menezes-Filho (2011) investigated the alignment of business process to ICT infrastructure. This alignment is critical to ICT adoption in businesses (Commander, Harrison, & Menezes-Filho, 2011).

In a study investigating Singapore's economic success over the period 1990 – 2008, Vu (2013) found that ICT investment contributed approximately 1 percentage point to Singapore's GDP growth.

His research made three significant findings:

1. A strong positive correlation between the intensity of ICT use and value-added as well as labour productivity growth at the sector level.
2. ICT Investment contributed positively to Singapore's GDP.
3. ICT manufacturing sector's contribution to Singapore's GDP growth was disproportional and notable (Vu, 2013)

In their study of ICT and productivity, Cordona, Kretschmer and Strobel (2013) concur that most literature relate positive effects on productivity from ICT. As a general purpose technology, they delve into ICT in the Unites States where a positive

relationship with technological innovation had been demonstrated (Cardona, Kretschmer, & Strobel, 2013).

## **ICT MATURITY IN BUSINESS**

A large amount of maturity models exist in literature, the first to apply them to the ICT sector was Richard Nolan in 1979 with his Stage Hypothesis on the maturity of technology within organisations.

Kohlegger, Maier and Thalmann (2009) investigated the nature of maturity models relating to the ICT research area by applying structured content analyses on 16 maturity models. In their study they found striking similarities in the designs of these maturity models and construct differences, which they described in their approach to maturity model design.

Kohlegger *et al*, explain the maturity model as “Maturing has been used as an analytic, explanatory or normative concept in several domains, the most well-known of which is software engineering”. (Kohlegger, Maier, & Thalmann, 2009)

As an indicator ICT maturity level, both at country level and business levels, is thus a measure of progressiveness on the ICT roadmap and can be used to benchmark peers.

In their study of 159 counties Kyriakidou, Michalakeis and Sphicopoulos (2013) used structural equation modelling to improve the ICT development index (IDI) proposed by the ITU in 2009. Their study has put forward the ICT maturity level index (IMLI) as a country level index consisting of three sub-indices, access, use and skills (Kyriakidou, Michalakelis, & Sphicopoulos, 2013).

A study of ICT stages of development and business sophistication found that greater utilisation of e-commerce and e-business improves the ICT stage and overall business sophistication of the country (Ogrean, Herciu, & Belascu, 2010).

Yunis, Koong, Liu, Kwan and Tsang (2012) in their research evaluated how ICT maturity and global competitiveness on a country level are related. After factor

clustering differing ICT indicators, they used structural equation modelling under the following categories: usage, readiness and environment. Their study has three significant findings:

1. ICT plays an important role in driving a country's global competitiveness.
2. ICT maturity was found to mediate the relationship between ICT quality and R&D spending.
3. The relationship between R&D spending and global competitiveness was found to be stronger for low readiness countries.

(Yunis, Koong, Liu, Kwan, & Tsang, 2012)

This concludes the research on country level ICT maturity level, in the next section business level maturity will be reviewed.

Pham (2010) devises a business level ICT Maturity index based on four factors derived from a factor analysis, these are:

1. Infrastructure
2. Application
3. Human Recourse
4. ICT Policy

His research is limited to SME's (Small and Medium enterprises) and thus the maturity level index has inadequate applicability on large corporations. From a trend analysis on the SME ICT Maturity level index, Pham identifies five stages of ICT maturity and development:

1. Inactive
2. Basic
3. Substantial
4. Web-based
5. Knowledge Orientated

(Pham, 2010)



## **CONCLUSION TO LITRITURE REVIEW**

The literature review broadly reviewed the theory base of the digital divide, mobile technology diffusion and the economic benefits of ICT diffusion.

The review then progressed into ICT infrastructure and access and narrowed down the subject scope of the literature review.

ICT infrastructure and access was followed by ICT Maturity models both at a country and business level.

Thus, this research report finds value and adds to the subject's areas in that it spans three differing subject matters namely the relationship of ICT maturity level on a business level and the ICT infrastructure investment on a country level.

The study investigates whether greater investment in ICT Infrastructure at a macro level improves the micro level business ICT maturity level. It further also investigates if urban SME's benefit to a greater extent than rural SME's from increased ICT infrastructure investment.

### 3. RESEARCH QUESTIONS AND HYPOTHESES

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#### RESEARCH QUESTIONS

A research question may be one overall question or a number of key questions that the research will address. (Saunders & Lewis, 2012)

The following research questions are addressed in this study.

Research Question 1:

Does greater ICT infrastructure investment improve ICT maturity level in SME's in Africa?

Research Question 2:

Do urban SME's benefit more than Rural SME's in terms of ICT Maturity Level if there has been increased ICT Infrastructure investment in that African country?

## RESEARCH HYPOTHESIS

A hypothesis is a testable proposition stating that there is a significant difference or relationship between two or more variables. (Saunders & Lewis, 2012)

### Hypothesis 1

This research hypothesis is aimed at answering research question one.

Companies where there is a greater level of ICT Infrastructure investment have greater ICT Maturity Levels in business in Africa

Let  $\mu$  = mean ICT Maturity Level Index value

Null Hypothesis H0:

Having increased ICT Infrastructure Investment in a country yields no greater ICT Maturity Level index than not.

$$\mu_1 \leq \mu_2$$

Alternate Hypothesis H1:

Having increased ICT Infrastructure Investment in a country yields greater ICT Maturity Level index than not.

$$\mu_1 > \mu_2$$

## Hypothesis 2

This research hypothesis is aimed at answering research question two.

Urban SME's in Africa have no greater ICT maturity levels than rural SME's in countries where there has been an increased ICT infrastructure investment.

Let  $\mu$  = mean ICT Maturity Level Index value

Null Hypothesis H0:

Having an urban location to your SME in African countries where there has been an increased ICT Infrastructure Investment yields no greater ICT Maturity Level than having a rural location.

$$\mu_1 \leq \mu_2$$

Alternate Hypothesis H1:

Having an urban location to your SME in African countries where there has been an increased ICT Infrastructure Investment yields greater ICT Maturity Level than having a rural location.

$$\mu_1 > \mu_2$$

## **4. RESEARCH METHODOLOGY**

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A descriptive study is a research design to produce an accurate representation of persons, events or situations. (Saunders & Lewis, 2012)

Quantitative data consist of numbers or data that have been quantified, such as tables of figures. (Saunders & Lewis, 2012)

This descriptive quantitative study has used secondary data from two sources, International Telecommunications Union and Research ICT Africa.

The Research ICT Africa (RIA) is a non-profit research entity conducting research into ICT matters in Africa. Their survey called the ICT Access and usage survey is conducted annually and the 2012 dataset was used for the purpose of this study (ICT Research Africa, 2012).

### **RESEARCH UNIT OF ANALYSIS**

A unit of data is a predetermined piece of data such as a line of a transcript, sentence, paragraph, or response. (Saunders & Lewis, 2012)

Once all relevant data was aggregated the African country became the unit of analysis.

A cross country comparison will also be done incorporating enumerator areas for urban and rural businesses as well as the two samples.

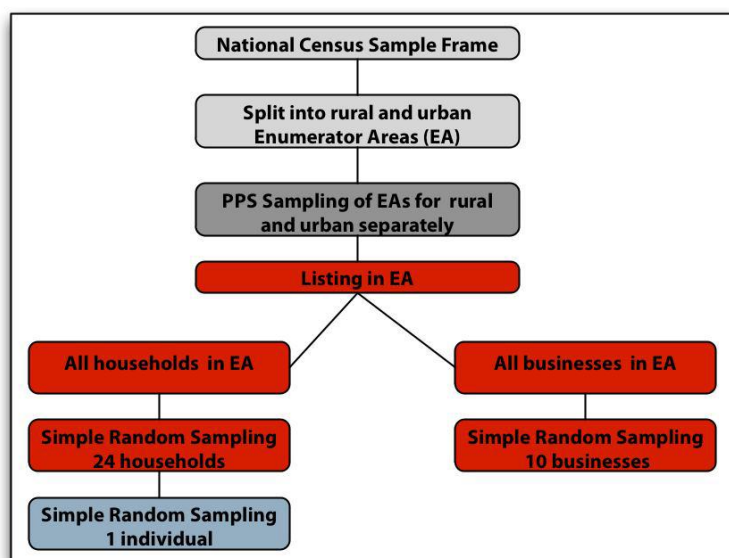
### **RESEARCH POPULATION**

A population is a complete set of group members. (Saunders & Lewis, 2012)

Their annual survey has two populations, one contained to households and the other to business within urban and rural areas. This study will make use of the business survey.

Figure 1 obtained from Research ICT Africa survey methodology document explains the sample frame and sampling method used in the survey (ICT Research Africa, 2012).

Figure 1: Sampling Frame and methodology (Research ICT Africa 2012)



The population spans 12 African countries split into two enumerator areas (Rural and Urban):

**Table 1 : RIA Surveyed Countries**

1. Uganda
2. Kenya
3. Tanzania
4. Rwanda
5. Ethiopia
6. Ghana
7. Cameroon
8. Nigeria
9. Namibia
10. South Africa

11. Botswana
12. Mozambique

## RESEARCH SAMPLING METHOD AND SIZE

A sampling frame is the complete list of all members of the total population. (Saunders & Lewis, 2012)

Simple random sampling is a type of probability sampling in which each member of the population has an equal chance of being selected at random and included in the sample. (Saunders & Lewis, 2012)

From the Research ICT methodology document (ICT Research Africa, 2012) the following sampling method was used comprising of 4 steps:

1. The national census sample frame was split into urban and rural enumerator areas
2. Enumerator areas were sampled for each stratum using probability proportional to size.
3. For each enumerator area a business listing was compiled. These listings served as the sample frame for the simple random sections
4. 10 Businesses were sampled using simple random sampling within each enumerator area.

ICT Research Africa used the following equation to obtain the minimum sample size for the business survey. (ICT Research Africa, 2012)

$$n = \left( \frac{Z_a \sqrt{p(1-p)}}{C_p} \right)^2 = \left( \frac{1.96 \sqrt{0.5(1-0.5)}}{0.05} \right)^2 = 384$$

Table 1 shows the sample sizes that were obtained by the survey. (ICT Research Africa, 2012)



Table 2: Sample Sizes obtained Research ICT Africa

Country		Sample Size
Valid	Uganda	500
	Kenya	513
	Tanzania	491
	Rwanda	640
	Ethiopia	841
	Ghana	500
	Cameroon	520
	Nigeria	554
	Namibia	374
	South Africa	627
	Botswana	386
	Mozambique	495
	<b>Total</b>	<b>6441</b>
Missing	System	20
<b>Total</b>		<b>6461</b>

## RESEARCH DATA GATHERING PROCESS

Research ICT Africa by extension of their partners in African countries has collected the data through a survey.

## RESEARCH DESIGN AND ANALYSIS APPROACH

The ICT Research business survey has 12 modules each containing variables, in total 555 variables:

1. Business Information
2. Supply Chain
3. Customers
4. Fixed-Line Access And Use
5. Mobile Access And Use
6. Computer
7. Business Skills Training
8. Internet Access And Use
9. Banking
10. Mobile Money Transfers And Banking Transactions
11. Financials
12. Business Climate

Within 12 modules variables have been selected and analysed that indicate the maturity of ICT use within business based on the research done by Pham (2010).

Pham grouped his variables into four categories:

1. Infrastructure
2. Application
3. Human Recourse
4. ICT Policy

Each category has a 25% weighting applied to aggregate up to the Maturity Level Index. Pham explains because there is limited research on the weightings of the ICT categories he assumes even distribution of weightings

A rotated factor analysis using principle axis factoring was done to establish both applicability and weightings of the RIA variables assigned to Pham's categories.

Grouping of variables was done based on Pham's ICT maturity level categories and the RIA Survey Variables to create the SME ICT Maturity Level Index (SMEICTMLI).

In all variables chosen a greater variable score indicates a greater level of ICT Maturity, binary variables were coded zero (0) for negative and one (1) for positive.

The RIA survey did not have any variables relating to ICT policy within SME's thus the category was omitted and an even distribution of weightings (0.33) was assumed between the remaining categories consistent with Pham 2010.

## SME ICT MATURITY LEVEL INDEX FUNCTION

The following function describes the SME ICT Maturity Level Index (SMEICTMLI):

$$\text{SMEICTMLI} = \alpha I + \beta A + \delta H$$

Where

$$(0 \leq I, A, H, \text{SMEICTMLI} \leq 1, \alpha + \beta + \delta = 1)$$

$\alpha$  = Infrastructure Weighting

$\beta$  = Application Weighing

$\delta$  = Human resource Weighing

### **Infrastructure:**

$$I = \sum_{k=1}^n i * iweighting$$

*iweighting* = category sub-index weighting

*i* = variable score

### **Application:**

$$A = \sum_{k=1}^n a * aweighting$$

*iweighting* = category sub-index weighting

*a* = variable score

### **Human Resource:**

$$H = \sum_{k=1}^n h * hweighting$$

*iweighting* = category sub-index weighting

*h* = variable score

The International Telecommunications Union (ITU) is the specialised division of the United Nations and a global authority on Information and Telecommunication Technology (ICT) development in the world today.

The ITU has developed a composite index called the ICT Development Index (IDI). In composing the IDI, ITU sourced data from UNCTAD, Eurostat, OECD, IMF, UNESCO, UNCTAD and the World Bank (Teltscher, et al., 2012).

The main purpose of the IDI was to, “provide policy makers with a useful tool to benchmark and assess their information society developments and to monitor progress that has been made globally to close the digital divide” furthermore the index “captures the level of advancement of information and communication technologies (ICTs) in more than 150 countries worldwide and compares progress made” (Teltscher, Magpantay, Gray, Olaya, & Vallejo, 2009)

The following is an extract from the 2012 Measuring the Information Society report published by the ITU explaining the inclusion of certain indicators and their relative weightings:

*“The selection of indicators was based on certain criteria, including relevance for the index objectives, data availability and the results of various statistical analyses.*

*The indicators and sub-indices included in the IDI were weighted based on the principal component analysis (PCA) results obtained when the index was first computed”* (Teltscher, et al., 2012).

The IDI has three (3) sub-indices with the following weightings associated:

1. ICT infrastructure and access (40%)
2. ICT use indicators (40%)
3. ICT skills indicators (20%)

Table 1 displays the sub-indices and their respective weightings as well as the indicators respective weighting within the Sub-index:

**Table 3 : Weights used for indicators and sub-indices included in the IDI :**  
**Source ITU 2012**

<b>Sub-Indices</b>	<b>Indicator</b>	<b>Sub-Indices Weighting</b>	<b>Index Weighting</b>
ICT Infrastructure and access	Fixed-telephone subscriptions per 100 inhabitants	0.2	0.4
	Mobile-cellular telephone subscriptions per 100 inhabitants	0.2	
	International Internet bandwidth per Internet user	0.2	
	Percentage of households with a computer	0.2	
	Percentage of households with Internet access	0.2	
ICT use	Percentage of individuals using the Internet	0.33	0.4
	Fixed (wired)-broadband subscriptions per 100 inhabitants	0.33	
	Active mobile-broadband subscriptions per 100 inhabitants	0.33	
ICT skills	Adult literacy rate	0.33	0.2
	Secondary gross enrolment ratio	0.33	
	Tertiary gross enrolment ratio	0.33	

Other indexes similar to the ICT development index have been developed that exclude the ICT skills sub-index namely the ICT Infrastructure and access index. (Hanafizadeh, Saghaei, & Hanafizadeh, 2009)

For the purpose of this study we used the IDI as it is the global benchmark in ICT development indicators.

The average of the IDI over the period 2002 - 2011 was used as a proxy for increased ICT infrastructure investment, this has significance as some ICT infrastructure investment projects are multi-year projects and return on investment is only realised in later years.

For this reason using IDI for a specific year would not suffice as a proxy for increased ICT Infrastructure investment.

A growth rate for each country surveyed in the RIA Survey for the period 2002 -2011 was then computed with the following formula:

$$IDI \text{ growth rate} = \frac{IDI \text{ 2011} - IDI \text{ 2002}}{IDI \text{ 2002}}$$

By establishing a growth rate the study was able to determine if the investment in ICT infrastructure in the country was declining or increasing. This is significant as it displays if a country where there has been major investment in the past is still aggressively investing in ICT infrastructure, or if this investment is in decline.

### **Splitting the population for hypothesis testing**

The median of the IDI period (2007 -2011) average for all countries was then computed.

The population was then in split in two, those countries that were above the median (Sample 1) and those that were below the median (Sample 2).

These two samples were then used for hypothesis testing.

Sample one (1) was used for testing research question two (2). Sample one (1) from the hypothesis one became the population of hypothesis two, the population was then split into two samples based on location, that of urban and rural businesses.

## STATISTICAL TEST FOR HYPOTHESIS

Our sample sizes are larger than 30 and thus normality can be assumed. Both our population standard deviations are unknown and are assumed to be unequal and thus we cannot pool sample standard deviations into a single estimate (Weiers, 2008)

For this reason the appropriate statistical test to use for our hypothesis is called the unequal-variances t-test for comparing the means of two independent samples.

Figure 1 is an extract from Weiers (2008) explaining the t-test.

**Figure 2: Unequal-variance t-test, two independent samples, Source: Weiers 2008**

$$t = \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)_0}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

where  $\bar{x}_1$  and  $\bar{x}_2$  = means of samples 1 and 2  
 $(\mu_1 - \mu_2)_0$  = hypothesized difference between the population means  
 $n_1$  and  $n_2$  = sizes of samples 1 and 2  
 $s_1$  and  $s_2$  = standard deviations of samples 1 and 2

with

$$df = \frac{[(s_1^2/n_1) + (s_2^2/n_2)]^2}{\frac{(s_1^2/n_1)^2}{n_1 - 1} + \frac{(s_2^2/n_2)^2}{n_2 - 1}}$$

Confidence interval for  $\mu_1 - \mu_2$ :

with

$$(\bar{x}_1 - \bar{x}_2) \pm t_{\alpha/2} \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$$

$\alpha = (1 - \text{confidence coefficient})$

The unequal variance t-Test for independent samples is used for both hypothesis one (1) and two (2) comparing the means.



## RESEARCH LIMITATIONS

Pham's (2010) work on maturity level of SME's does not match the RIA survey completely. The implication is that the maturity level index used is only partially based on his Maturity level Index. This new SME ICT Maturity Level Index has new components that will not yield exactly the same maturity level as Pham's index would.

This limitation is insignificant as the indicators used fall within the categories stated by Pham and are more closely related to SME ICT Maturity Level Index. The RIA survey comprised of 555 variables which is much greater than those comprised in Pham's study.

## 5. RESULTS

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### DESCRIPTIVE ANALYSIS OF DATA

Table 5 below describes the total number of surveys that were completed and is the original population from which the research was conducted.

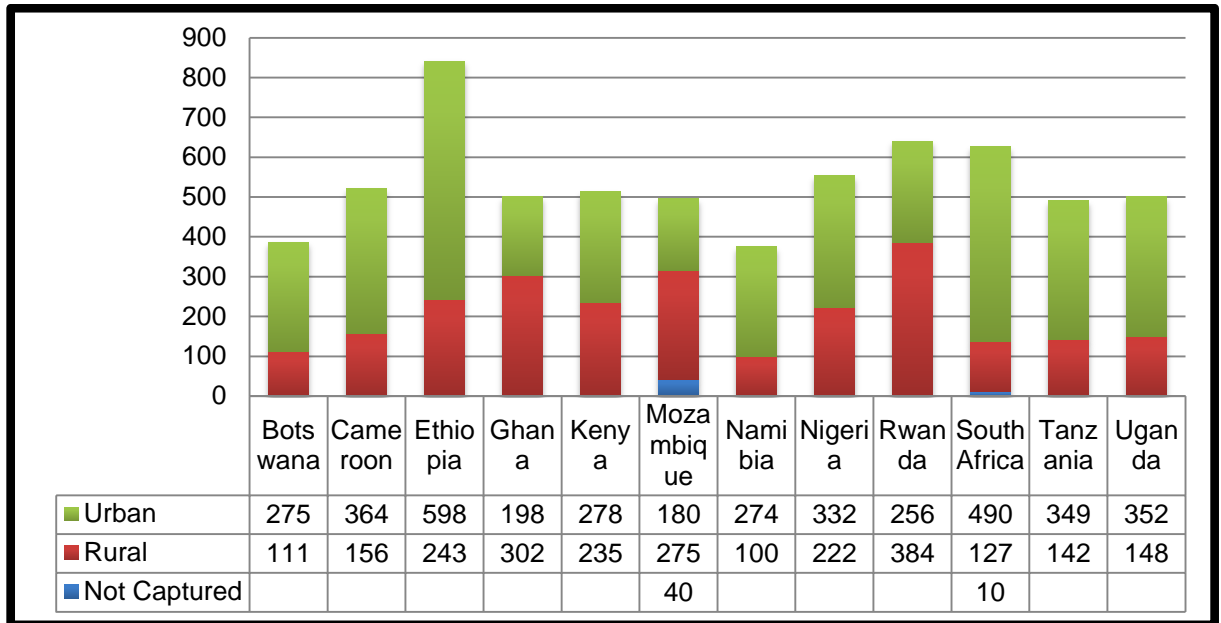
**Table 4 : Number of Surveys completed per country**

		Frequency	Percent	Valid Percent	Cumulative Percent
	Uganda	500	7.7	7.8	7.8
	Kenya	513	7.9	8.0	15.7
	Tanzania	491	7.6	7.6	23.4
	Rwanda	640	9.9	9.9	33.3
	Ethiopia	841	13.0	13.1	46.3
	Ghana	500	7.7	7.8	54.1
Valid	Cameroon	520	8.0	8.1	62.2
	Nigeria	554	8.6	8.6	70.8
	Namibia	374	5.8	5.8	76.6
	South Africa	627	9.7	9.7	86.3
	Botswana	386	6.0	6.0	92.3
	Mozambique	495	7.7	7.7	100.0
	Total	6441	99.7	100.0	
Missing	System	20	.3		
Total		6461	100.0		

Twenty (20) surveys do not have data completed with a missing percentage of 0.3%.

Figure 3 displays the Urban and Rural distribution by country indicating the location by country of SME's that were surveyed.

**Figure 3 : Urban / Rural Distribution by Country**



## FACTOR ANALYSIS

### Infrastructure

**Table 5 : Infrastructure Factor Analysis KMO and Bartlett's Test**

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.536
Approx. Chi-Square		134.509
Bartlett's Test of Sphericity	df	36
	Sig.	.000

The KMO and Bartlett's Test yields a value (0.536) which is greater than 0.5 and thus the factor analysis is valid and acceptable

**Table 6 : Infrastructure: Rotated Factor Matrix**

	Factor				Factor 2
	1	2	3	4	Weighting
Does your business have a working Fixed-line telephone connection	.133	<b>.077</b>	.336	-.047	.038
Does the business own any computers	.084	<b>.152</b>	-.197	.137	.075
Does your business have a local area network (LAN)	.130	<b>.533</b>	.155	.068	.264
Does your business have an intranet?	-.151	<b>.641</b>	-.054	.086	.317
Does your business have an Extranet?	.227	<b>.007</b>	.073	.779	.004
Does your business have internet access?	.075	<b>.163</b>	.032	-.066	.081
Narrow Band (Modem dial up, ADSL 256K or below) What type of internet access?	-.088	<b>.119</b>	.758	.260	.059
Fixed Broadband (eg ADSL above 256k speed) What type of internet access?	.682	<b>.266</b>	.072	.136	.131
Mobile Broadband (3G, wireless) What type of internet access?	-.559	<b>.062</b>	.007	-.105	.031

Extraction Method: Principal Axis Factoring.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 5 iterations.

Factor 2 was selected as the Infrastructure factor based on the best fit contributions towards the factor which yielded no negative factor contributions.

## Application

**Table 7 : Application KMO and Bartlett's Test**

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.780
Approx. Chi-Square		1006.554
Bartlett's Test of Sphericity	df	171
	Sig.	.000

The KMO and Bartlett's Test yields a value (0.780) which is greater than 0.5 and thus the factor analysis is valid and acceptable

**Table 8: Application Rotated Factor Matrix**

	Factor					Factor 1
	1	2	3	4	5	Weighting
A: Sending and receiving email What do you use the Internet for :	<b>.919</b>	-.034	.046	.002	.011	0.139
C: Getting information about goods and services What do you use the Internet for :	<b>.906</b>	.048	.084	.020	-.001	0.137
G: Providing customer services What do you use the Internet for :	<b>.785</b>	.111	.036	.017	.147	0.119
Has the business received orders via the Internet?	<b>.705</b>	.127	.031	.012	.443	0.107
Does your business have a website?	<b>.615</b>	.077	.091	.055	.178	0.093
I: Internal or external recruitment What do you use the Internet for :	<b>.576</b>	.272	.016	.031	.261	0.087
H: Delivering products online What do you use the Internet for :	<b>.544</b>	.238	.010	.027	.342	0.082
Does your business provide email addresses to employees	<b>.539</b>	.058	.079	.055	.097	0.082
E: Interacting with government organisations What do you use the Internet for :	<b>.105</b>	.883	-.002	.007	.107	0.016
D: Getting information from government organisations What do you use the Internet for :	<b>.102</b>	.808	.000	.026	.018	0.015
B: Telephoning over the Internet VoIP Skype What do you use the Internet for :	<b>.079</b>	.373	.036	.016	.226	0.012
F: Internet banking What do you use the Internet for :	<b>.113</b>	.364	.000	.005	.345	0.017
Does your business use mobile phones for business purposes?	<b>.049</b>	.009	.980	.037	.004	0.007
Does the business Manager have a mobile?	<b>.167</b>	.016	.752	.091	.003	0.025
Does the business send SMS or text messages for business purposes?	<b>.067</b>	.025	-.039	.927	.031	0.010
Does the business receive SMS or text messages for business purposes?	<b>.077</b>	.035	.539	.785	.035	0.012
Has the business purchased products/services via the Internet?	<b>.129</b>	.239	-.001	.002	.495	0.020
Does your company make use of Inventory Control Software?	<b>.099</b>	.024	-.008	.029	.315	0.015
Does your company use Anti-Virus software	<b>.035</b>	.015	.006	-.001	.180	0.005

Extraction Method: Principal Axis Factoring.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 5 iterations.

Factor 1 was selected as the Application factor based on the best fit contributions towards this factor which yielded no negative factor contributions.

### Human resource

**Table 9 : Human Resource KMO and Bartlett's Test**

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.566
Approx. Chi-Square		422.140
Bartlett's Test of Sphericity	df	6
	Sig.	.000

The KMO and Bartlett's Test yields a value (0.566) which is greater than 0.5 and thus the factor analysis is valid and acceptable

**Table 10 : Human Resource Rotated Factor Matrix**

	Factor		Factor 1 Weighting
	1	2	
Does the business Manager have an email address?	<b>.686</b>	.238	0.425
J: Staff training e-learning What do you use the Internet for :	<b>.677</b>	.043	0.420
Have you ever attended formal training to improve your business skills?	<b>.236</b>	.341	0.146
Do you plan to employ more or less in 2012?	<b>.013</b>	.292	0.008

Extraction Method: Principal Axis Factoring.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 3 iterations.

Factor 1 was selected as the Human Resource factor based on the best fit contributions towards this factor which yielded no negative factor contributions.

## Result from factor analysis

The results from the factor analysis produced the following weightings per variable as displayed in Table 11 : SMEICTMLI Weightings below.

**Table 11 : SMEICTMLI Weightings**

Category	Var Code	Variable Description	Sub-Index Weighting	Category Weighting
Infrastructure	FI.1	Does your business have a working Fixed-line telephone connection	0.04	0.33
Infrastructure	CO.1	Does the business own any computers	0.08	
Infrastructure	CO.3	Does your business have a local area network (LAN)	0.26	
Infrastructure	CO.4	Does your business have an intranet?	0.32	
Infrastructure	CO.5	Does your business have an Extranet?	0.00	
Infrastructure	I.1	Does your business have internet access?	0.08	
Infrastructure	I.1a	Narrow Band (Modem dial up, ADSL 256K or below) What type of internet access?	0.06	
Infrastructure	I.1b	Fixed Broadband (eg ADSL above 256k speed) What type of internet access?	0.13	
Infrastructure	I.1c	Mobile Broadband (3G, wireless) What type of internet access?	0.03	
Application	D.21	Does your business have a website?	0.093	0.33
Application	D.22	Does your business provide email addresses to employees	0.082	
Application	CO.6	Does your company make use of Inventory Control Software?	0.015	
Application	CO.7	Does your company use Anti-Virus software	0.005	
Application	I.5.A	A: Sending and receiving email What do you use the Internet for :	0.139	
Application	I.5.B	B: Telephoning over the Internet VoIP Skype What do you use the Internet for :	0.012	
Application	I.5.C	C: Getting information about goods and services What do you use the Internet for :	0.137	
Application	I.5.D	D: Getting information from government organisations What do you use the Internet for :	0.015	
Application	I.5.E	E: Interacting with government organisations What do you use the Internet for :	0.016	
Application	I.5.F	F: Internet banking What do you use the Internet for :	0.017	
Application	I.5.G	G: Providing customer services What do you use the Internet for :	0.119	
Application	I.5.H	H: Delivering products online What do you use the Internet for :	0.082	
Application	I.5.I	I: Internal or external recruitment What do you use the Internet for :	0.087	
Application	M.1	Does your business use mobile phones for business purposes?	0.007	
Application	M.2	Does the business Manager have a mobile?	0.025	
Application	M.3	Does the business send SMS or text messages for business purposes?	0.010	
Application	M.4	Does the business receive SMS or text messages for business purposes?	0.012	
Application	I.6	Has the business received orders via the Internet?	0.107	
Application	I.7	Has the business purchased products/services via the Internet?	0.020	
Human Resources	I.5.J	J: Staff training e-learning What do you use the Internet for :	0.420	0.33
Human Resources	I.2	Does the business Manager have an email address?	0.425	
Human Resources	BC.3	Do you plan to employ more or less in 2012?	0.008	
Human Resources	Bs.1	Have you ever attended formal training to improve your business skills?	0.146	

Using these weightings the SME ICT Maturity level index was computed per business in the countries surveyed by RIA.

After the SMEICTMLI was computed per business the following descriptive statistics and sample frequencies were observed.

**Table 12 : Descriptive statistics SMEICTMLI**

	<i>Infrastructure Sub-Index</i>	<i>Application Sub-Index</i>	<i>Human Resource Sub-Index</i>	<i>SME ICT Maturity Level Index</i>
Mean	0.110	0.032	0.026	0.055
Standard Error	0.004	0.001	0.001	0.002
Median	0.072	0.018	0.003	0.015
Mode	0.013	0.011	0.003	0.011
Standard Deviation	0.105	0.053	0.065	0.146
Sample Variance	0.011	0.003	0.004	0.021
Kurtosis	-0.823	13.481	7.812	15.333
Skewness	0.739	3.682	2.938	3.966
Range	0.321	0.348	0.325	0.964
Minimum	0.013	0.002	0.000	0.002
Maximum	0.333	0.350	0.325	0.965
Sum	65.123	106.952	52.847	224.921
Count	590	3346.	2068	4079
Largest(1)	0.333	0.350	0.325	0.965
Smallest(1)	0.013	0.002	0.000	0.002
Confidence Level (95.0%)	0.009	0.002	0.003	0.004

Businesses that do not contain positively scored variables contributing to their SME ICT Maturity level will have a zero SMEICTMLI score.

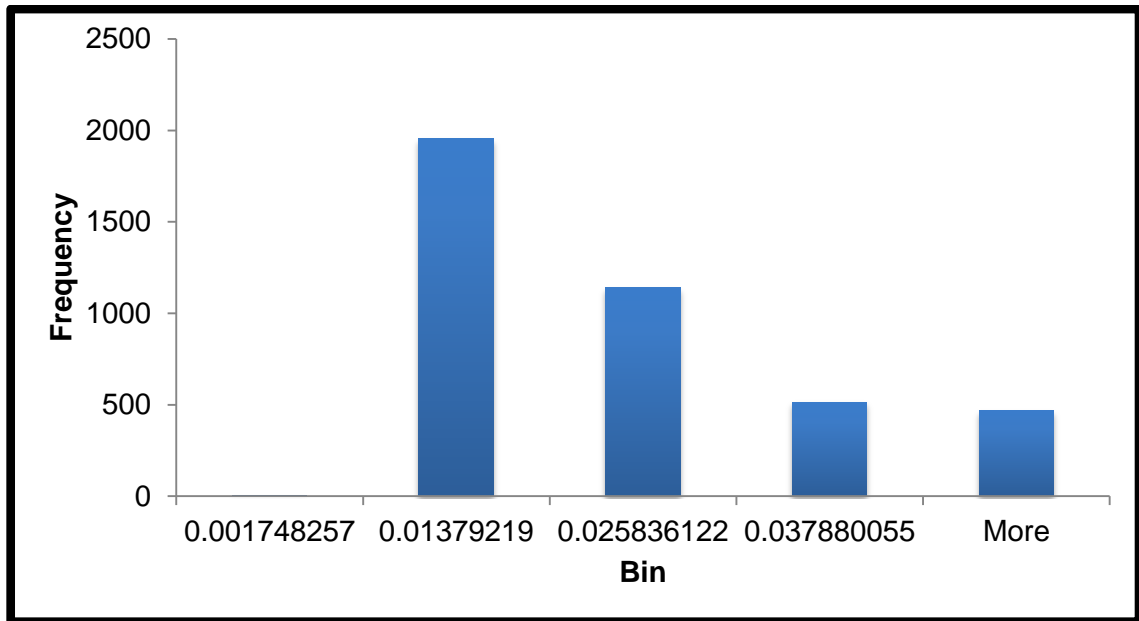
**Table 13 : SMEICTMLI valid Frequencies by Country**

<b>COUNTRY</b>	<b>Frequency</b>	<b>%</b>	<b>Cumulative %</b>
Botswana	207	5.07%	5.07%
Cameroon	323	7.92%	12.99%
Ethiopia	383	9.39%	22.38%
Ghana	308	7.55%	29.93%
Kenya	365	8.95%	38.88%
Mozambique	204	5.00%	43.88%
Namibia	280	6.86%	50.75%
Nigeria	385	9.44%	60.19%



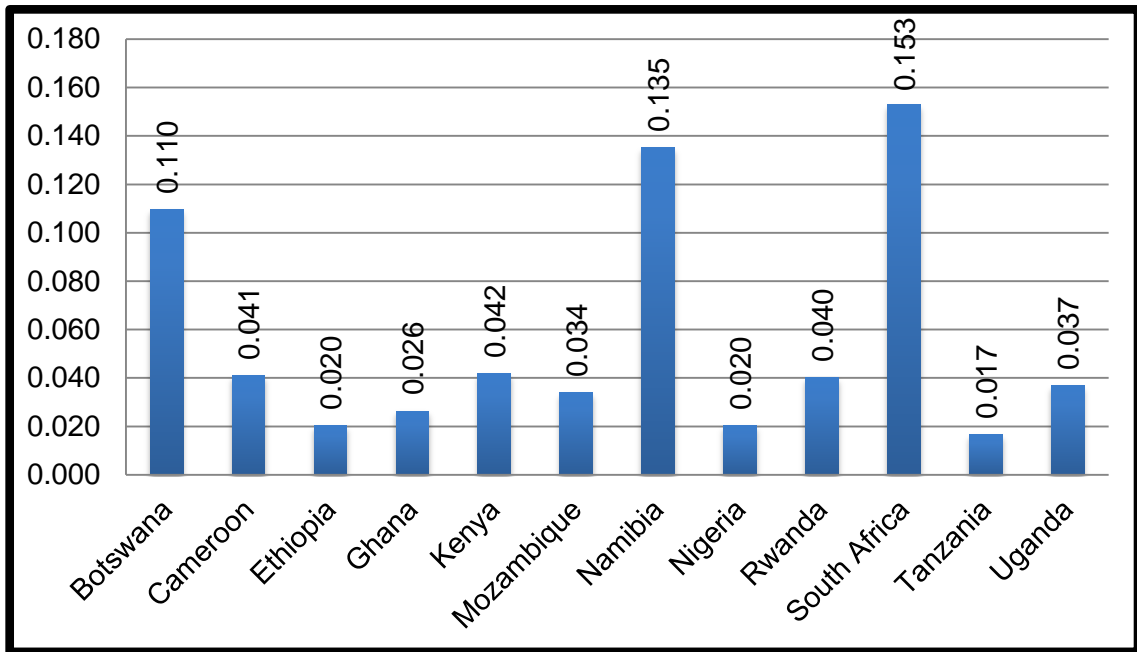
Rwanda	476	11.67%	71.86%
South Africa	433	10.62%	82.47%
Tanzania	318	7.80%	90.27%
Uganda	397	9.73%	100.00%
<b>Grand Total</b>	<b>4079</b>	<b>100.00%</b>	

**Figure 4 : Histogram SMEICTMLI**



The histogram for the SME ICT Maturity level index indicates that the index has frequencies that start as low as 0.0017. Majority of the businesses have index scores ranging from 0.013 – 0.025 (75.9%).

**Figure 5 : Mean SME ICT Maturity Level Index by country**



The highest mean SME ICT maturity level index is South Africa (0.153) with Namibia (0.135) and Botswana (0.110) in second and third ranked position.

## **INFORMATION AND TELECOMMUNICATION TECHNOLOGY (ICT) DEVELOPMENT INDEX (IDI)**

The IDI from the ITU for the period 2002 - 2011 yields the following results as displayed in Table 12. The

**Table 14 : IDI by Year for RIA surveyed countries**

<b>RIA Surveyed Country / IDI</b>	<b>IDI Score per Year</b>				
	<b>2002</b>	<b>2007</b>	<b>2008</b>	<b>2010</b>	<b>2011</b>
<b>Ghana</b>	1.10	1.63	1.75	1.90	2.23
<b>Kenya</b>	1.21	1.62	1.69	2.29	2.32
<b>Uganda</b>	0.92	1.21	1.30	1.49	1.67
<b>Nigeria</b>	1.09	1.39	1.65	1.85	1.93
<b>Rwanda</b>	0.99	1.17	1.19	1.44	1.66
<b>Tanzania</b>	0.96	1.13	1.17	1.51	1.60
<b>Mozambique</b>	0.77	1.02	1.05	1.30	1.28
<b>South Africa</b>	2.11	2.70	2.79	3.00	3.42
<b>Namibia</b>	1.58	1.92	2.04	2.36	2.51
<b>Botswana</b>	1.70	2.10	2.30	2.59	2.67
<b>Ethiopia</b>	0.78	1.03	1.03	1.08	1.15
<b>Cameroon</b>	1.12	1.46	1.40	1.53	1.60

The ITU has had years where the IDI has not been computed, these are 2003 – 2006 as well as 2009.

The period 2002 – 2007 is the longest and as such will display the greatest growth levels in terms of IDI scores. Thus when calculating the average of the IDI scores for a period the year 2002 will not be included as it will decrease the average of a current period e.g. 2007 - 2011 with a less recent IDI score (2002).

Table 13 shows the growth rates of the IDI by the differing period. The period 2002 – 2007 was the first period in which growth of the IDI was computed. There after the period 2007 – 2011 and finally the total period 2002 – 2011. The table was sorted in descending order by the total period (2002 - 2011) growth rate.

**Table 15 : IDI period growth rate**

RIA Surveyed Country / IDI	Period Growth		
	2002 - 2007	2007 - 2011	2002 - 2011
<b>Ghana</b>	48.2%	36.81%	102.7%
<b>Kenya</b>	33.9%	43.21%	91.7%
<b>Uganda</b>	31.5%	38.02%	81.5%
<b>Nigeria</b>	27.5%	38.85%	77.1%
<b>Rwanda</b>	18.2%	41.88%	67.7%
<b>Tanzania</b>	17.7%	41.59%	66.7%
<b>Mozambique</b>	32.5%	25.49%	66.2%
<b>South Africa</b>	28.0%	26.67%	62.1%
<b>Namibia</b>	21.5%	30.73%	58.9%
<b>Botswana</b>	23.5%	27.14%	57.1%
<b>Ethiopia</b>	32.1%	11.65%	47.4%
<b>Cameroon</b>	30.4%	9.59%	42.9%

Table 14 displays the growth in terms of IDI scores over periods 2002 - 2011. It is important to note that none of the countries where in decline and all countries have a positive IDI growth rate, even for the recent period 2007 -2011.

Table 15 below displays the result of the average IDI score over the period 2007 – 2011.

**Table 16 : Average IDI (2007 -2011)**

RIA Surveyed Country / IDI	IDI Score per Year					Average 2007 -2011
	2002	2007	2008	2010	2011	
South Africa	2.11	2.70	2.79	3.00	3.42	2.98
Botswana	1.70	2.10	2.30	2.59	2.67	2.42
Namibia	1.58	1.92	2.04	2.36	2.51	2.21
Kenya	1.21	1.62	1.69	2.29	2.32	1.98
Ghana	1.10	1.63	1.75	1.90	2.23	1.88
Nigeria	1.09	1.39	1.65	1.85	1.93	1.71
Cameroon	1.12	1.46	1.40	1.53	1.60	1.50
Uganda	0.92	1.21	1.30	1.49	1.67	1.42
Rwanda	0.99	1.17	1.19	1.44	1.66	1.37
Tanzania	0.96	1.13	1.17	1.51	1.60	1.35
Mozambique	0.77	1.02	1.05	1.30	1.28	1.16
Ethiopia	0.78	1.03	1.03	1.08	1.15	1.07

Table 15 was sorted in descending order based on the average IDI for the period 2007 – 2011. The median of the average IDI was 1.6 Thus the following countries were above the median for the period 2007 – 2011.

- South Africa
- Botswana
- Namibia
- Kenya
- Ghana
- Nigeria

The following countries have below median for the period 2007 – 2011:

- Cameroon
- Uganda
- Rwanda
- Tanzania
- Mozambique
- Ethiopia

## **HYPOTHESIS 1**

Companies where there is a greater level of ICT Infrastructure investment have greater ICT Maturity Levels in business in Africa

For this hypothesis the study examines average IDI for the period (2007 -2011) and segregates the countries by those above and below median. The study uses the IDI as the proxy for increased ICT infrastructure investment.

The research splits the samples in two as stated below:

Sample 1 is the SME businesses in the in the RIA survey in countries that have above median IDI for the period 2007 – 2011.

**Table 17 : Sample 1 Count of Index**

<b>COUNTRY</b>	<b>Count of Index</b>
South Africa	433
Botswana	207
Namibia	280
Kenya	365
Ghana	308
Nigeria	385
<b>Grand Total</b>	<b>1978</b>

**Table 18 : Sample 1 Descriptive Statistics**

Mean	0.0798
Standard Error	0.0041
Median	0.0181
Mode	0.0028
Standard Deviation	0.1845
Sample Variance	0.0341
Kurtosis	7.8659
Skewness	2.9840
Range	0.9635
Minimum	0.0017
Maximum	0.9653
Sum	157.8943
Count	1978
Largest(1)	0.9653
Smallest(1)	0.0017
Confidence Level (95.0%)	0.0081

Sample 2 is the SME businesses in the RIA survey in countries that have a below median IDI for the period 2007 – 2011.

**Table 19 : Sample 2 Count of Index**

<b>COUNTRY</b>	<b>Count of Index</b>
Cameroon	323
Ethiopia	383
Mozambique	204
Rwanda	476
Tanzania	318
Uganda	397
<b>Grand Total</b>	<b>2101</b>

**Table 20 : Sample 2 Descriptive Statistics**

Mean	0.0319
Standard Error	0.0020
Median	0.0137
Mode	0.0109
Standard Deviation	0.0905
Sample Variance	0.0082
Kurtosis	39.3119
Skewness	6.0616
Range	0.8368
Minimum	0.0017
Maximum	0.8386
Sum	67.0264
Count	2101
Largest(1)	0.8386
Smallest(1)	0.0017
Confidence Level (95.0%)	0.0039

Let  $\mu_1$  = mean SME ICT Maturity Level Index in Sample 1

Let  $\mu_2$  = mean SME ICT Maturity Level Index in Sample 2

Null Hypothesis H0:

Having increased ICT Infrastructure Investment in a country yields no greater SME ICT Maturity Level index than not.

$$\mu_1 \leq \mu_2$$

Alternate Hypothesis H1:

Having increased ICT Infrastructure Investment in a country yields greater SME ICT Maturity Level index than not.

$$\mu_1 > \mu_2$$



A t-Test assuming unequal variances for independent samples was performed with the following result:

**Table 21 : Hypothesis 1 t-Test: Two-Sample Assuming Unequal Variances**

	<i>Sample 1 SMEICTMLI</i>	<i>Sample 2 SMEICTMLI</i>
Mean	0.079825251	0.031902135
Variance	0.034054521	0.008189102
Observations	1978	2101
Hypothesized Mean Difference	0	
df	2837	
t Stat	10.42932229	
P(T<=t) one-tail	2.565335E-25	
t Critical one-tail	1.645390909	
P(T<=t) two-tail	5.13067E-25	
t Critical two-tail	1.960800525	

This is a one sided test with directionality and thus the p value of the one-tail test was used.

The test is significant at  $\alpha=0.05$  with a p value =  $2.56^{-25}$  which is less than 0.05. The t statistic value 10.42 falls within the rejection region as it is greater than the t critical value (1.64) for the one tail test.

The study thus rejects the null hypothesis (H0) and the researcher finds strong evidence that SME's in African countries where there has been and increased level of ICT infrastructure investment have a greater level of ICT Maturity.

## HYPOTHESIS 2

This research hypothesis is aimed at answering research question two (2).

Do urban SME's benefit more than Rural SME's in terms of ICT Maturity Level if there has been increased ICT Infrastructure investment?

The population of this hypothesis is the countries where the average IDI for the period (2007 – 2011) have been above the median of all countries.

The population was then split into two samples those that have an urban location (Sample 1) and those that have a rural location (Sample 2).

### Population

**Table 22 : H2 population**

<b>COUNTRY</b>	<b>Count of Index</b>
South Africa	433
Botswana	207
Namibia	280
Kenya	365
Ghana	308
Nigeria	385
<b>Grand Total</b>	<b>1978</b>

**Table 23 : H2 Population descriptive statistics**

Mean	0.0798
Standard Error	0.0041
Median	0.0181
Mode	0.0028
Standard Deviation	0.1845
Sample Variance	0.0341
Kurtosis	7.8659
Skewness	2.9840
Range	0.9635
Minimum	0.0017
Maximum	0.9653
Sum	157.8943
Count	1978
Largest(1)	0.9653
Smallest(1)	0.0017
Confidence Level(95.0%)	0.0081

Sample 1 is the businesses in countries that have a higher than median IDI score for the period 2007 -2011 and are in an urban location.

**Table 24 : H2 Sample 1 Count**

<b>Country</b>	<b>Count of Index</b>
South Africa	353
Botswana	165
Namibia	232
Kenya	200
Ghana	137
Nigeria	246
<b>Grand Total</b>	<b>1333</b>

Sample 1 has 1333 businesses that are within an urban location.

**Table 25 : H2 Sample1 descriptive statistics**

Mean	0.1033
Standard Error	0.0058
Median	0.0181
Mode	0.0181
Standard Deviation	0.2103
Sample Variance	0.0442
Kurtosis	4.5246
Skewness	2.4094
Range	0.9635
Minimum	0.0017
Maximum	0.9653
Sum	138
Count	1333
Largest(1)	0.9653
Smallest(1)	0.0017
Confidence Level(95.0%)	0.0113

Sample 2 is the businesses in countries that have a higher than median IDI score for the period 2007 -2011 and are in a rural location.

**Table 26 : H2 Sample 2 Count**

<b>Countries</b>	<b>Count Index</b>
South Africa	78
Botswana	42
Namibia	48
Kenya	165
Ghana	171
Nigeria	139
<b>Grand Total</b>	<b>643</b>

Sample two has 643 businesses that are within a rural location.

**Table 27 : H2 Sample2 descriptive statistics**

Mean	0.03028
Standard Error	0.00374
Median	0.01366
Mode	0.00277
Standard Deviation	0.09493
Sample Variance	0.00901
Kurtosis	52.90745
Skewness	6.98270
Range	0.90447
Minimum	0.00247
Maximum	0.90694
Sum	19.47016
Count	643.00000
Largest(1)	0.90694
Smallest(1)	0.00247
Confidence Level (95.0%)	0.00735

Let  $\mu_1$  = mean SME ICT Maturity Level Index in Sample 1

Let  $\mu_2$  = mean SME ICT Maturity Level Index in Sample 2

Null Hypothesis H0:

Having an urban location to your SME in African countries where there has been an increased ICT Infrastructure Investment yields no greater ICT Maturity Level than having a rural location.

$$\mu_1 \leq \mu_2$$

Alternate Hypothesis H1:

Having an urban location to your SME in African countries where there has been an increased ICT Infrastructure Investment yields greater ICT Maturity Level than having a rural location.

$$\mu_1 > \mu_2$$

A t-Test assuming unequal variances for independent samples was performed with the following result:

**Table 28 :H2 t-Test Two-Sample Assuming Unequal Variances**

	<i>Sample 1</i> <i>SMEICTMLI</i>	<i>Sample 2</i> <i>SMEICTMLI</i>
Mean	0.103344812	0.030280182
Variance	0.04421159	0.009010903
Observations	1333	643
Hypothesized Mean Difference	0	
df	1967	
t Stat	10.63712854	
P(T<=t) one-tail	4.93431E-26	
t Critical one-tail	1.645628661	
P(T<=t) two-tail	9.86861E-26	
t Critical two-tail	1.96117075	

This is a one sided test with directionality and thus the p value of the one-tail test was used.

The test is significant at  $\alpha=0.05$  with a p value =  $4.93^{-26}$  which is less than 0.05. The t statistic value 10.63 falls within the rejection region as it is greater than the t critical value (1.64) for the one tail test.

The study thus rejects the null hypothesis (H0) and the researcher finds strong evidence that urban SME's have a greater level of ICT Maturity than rural, in African countries where there has been increased ICT infrastructure investment.

## **SUMMARY OF RESULTS**

Having analysed all sets of data from both Research ICT Africa and the International Telecommunications Union the answers to our research questions were obtained through hypothesis testing.

The results of these hypothesis tests are summarised below:

Hypothesis 1:

The study was able to reject the null hypothesis and find strong evidence that SME's in African countries where there has been an increased level of ICT infrastructure investment have a greater level of ICT Maturity.

Hypothesis 2:

The study was able to reject the null hypothesis and find strong evidence that urban SME's have a greater level of ICT Maturity than rural SME's in African countries where there has been increased ICT infrastructure investment.

## 6. DISCUSSION OF RESULTS

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### INTRODUCTION

The research was aimed at finding out whether a greater level of ICT infrastructure investment has a positive effect on ICT maturity level within small and medium sized businesses in Africa.

The research further aimed to establish if urban SME's in Africa benefit with a greater level of ICT maturity from increased levels of ICT infrastructure investment than rural SME's.

Previous studies on measuring the digital divide have been focussed on the macro level and have classified the disparity of countries in terms of their ICT infrastructure and access (Hanafizadeh, Saghaei, & Hanafizadeh, 2009). There exist a number of macro level indexes that focuses on comparison between countries aiming to quantify the digital divide.

Few studies analysing the micro level ICT maturity within business put forward a measurement instrument. Pham (2010) in his study aims to do so but does not relate this micro level analysis of SME's back to the macro level.

The following chapter will discuss the results of the study and their findings.



## RESEARCH QUESTION 1

*Does greater ICT infrastructure investment improve ICT maturity level in SME's in Africa?*

From the study it has been empirically proven that having greater ICT infrastructure investment improves the ICT Maturity level within SME's in Africa.

On initial descriptive inspection (Table 18 : Sample 1 Descriptive Statistics) one might make this conclusion as the mean of the ICT Maturity Level index in sample 1 is greater than the mean of sample 2. This finding though is empirically proven when the study was able to reject the null hypothesis in favour of the alternate hypothesis.

The result was gained with an alpha level = 0.05. Thus the study would only be able to reject the null hypothesis if the probability of gaining such a result was less than 0.05 which demonstrates that it was an extreme result.

For research question 1 the study was able to do so.

Bollo et al express concern about the lack of effectiveness research in the area of ICT Infrastructure investment.

This study has found significant evidence that ICT infrastructure is effective in driving ICT maturity in SME's in Africa.

Few studies relate the macro level environment to the micro. Majority of indicators which set out to measure the digital divide do so at a country level. One must then ask if the advancement of a country is linked to ICT diffusion (Pick & Azari, 2008) why not relate the micro level with the greater macro level

Some composite indexes have been proven to have inadequacies (Bruno, Esposito, Genovese, & Gwebu, 2011), in this study we made use of a rotated factorial analysis to prove applicability to the composite SME ICT maturity level index. The weightings obtained from the analysis prove strong contributions to the categories first explained by Pham in the 2010 study.

Mobile communication technology and its variables made up a portion of the SME ICT Maturity level index. Chircu et al try to understand if mobile technology can bridge the digital divide. In this study there exists evidence to suggest that mobile alone cannot bridge the digital divide and that a combination of a multitude of ICT infrastructure components need to be considered.

Blignaut as well as Mamagha all agree and states that there is more to ICT Infrastructure diffusion than just giving access to it.

## RESEARCH QUESTION 2

*Do urban SME's benefit more than Rural SME's in terms of ICT Maturity Level if there has been increased ICT Infrastructure investment in that African country?*

The study has empirically proven that urban located SME's have a greater level of ICT maturity than rural SME's, when there has been an increased level of ICT infrastructure investment.

Empirically the findings were proven when the study was able to reject the null hypothesis in favour of the alternate hypothesis.

The result was gained with an alpha level = 0.05. Thus the study would only be able to reject the null hypothesis if the probability of gaining such a result was less than 0.05 which demonstrates that it was an extreme result.

For research question 2 the study was able to do so

Not only is it accepted that ICT access is not uniform (Doong & Ho, 2012) and that countries in developing nations have unequal access, this study also proves that within country level urban and rural SME's do not enjoy the same benefits from ICT infrastructure investment.

Ngwenyama et al are concerned that developing countries do not see the same returns from ICT infrastructure investment, this study could provide evidence to the fact that the returns are unequal and biased towards urban areas, and thus improving rural ICT infrastructure might improve return on investment.

Developing nations by nature have large rural area thus not only does physical infrastructure play a part but also governmental support. This is echoed by Pick (2009) et al where they assert influence on technology usage from governmental factors

Min in his 2010 study is concerned that there exists a new secondary digital divide, this study echoes this assertion to some extent as the study finds significant evidence that

not all SME's in Africa enjoy the same levels of ICT maturity. This study shows another level of digital divide in the ICT maturity level or urban and rural SME's in Africa.

## 7. CONCLUSION

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### SUMMARY OF MAJOR FINDINGS

The research was conducted using secondary data from two sources and statistical methods where used to analyse the data.

Research questions were set up and answered by hypothesis testing. These research questions answered some fundamental matters. More so the research questions delved into the effectiveness of ICT infrastructure investment, an area that remains scantily researched (Bollou & Ngwenyama, 2008).

Research question 1 asked if ICT infrastructure investment increased the ICT maturity levels of SME's in Africa.

**Finding:**

The study finds strong evidence that increased ICT infrastructure investment increases the ICT maturity level within SME's in Africa.

Research questions 2 asked if urban SME's benefit more than rural SME's in African countries where there has been increased infrastructure investment. It does so by analysing the ICT maturity level of these urban and rural SME's

**Finding:**

The study found significant empirical evidence to substantiate that indeed urban SME's have a higher ICT maturity level than rural SME's in African countries where there has been increased ICT infrastructure investment.

## POLICY IMPLICATIONS

Both research questions have significant ICT infrastructure investment policy implications, both for governmental agency as well as the private sector.

Min (2010) states that research is now concerned with the new digital divide between those that have sufficient and advanced internet skills and those that do not.

This study maintains that there is still significant evidence that ICT infrastructure in African countries is lagging the developing world.

Furthermore it shows another level of digital divide: that of urban and rural SME's. Although mobile diffusion of telecommunication technology is rapidly changing the SME landscape the research shows that mobile alone does not sufficiently bridge the digital divide and improve ICT maturity level.

Both governmental policy makers and private sector investors need to consider applicable locations based ICT infrastructure investment decisions. These need to benefit SME's on a micro level regardless if location and distance to metropolitans.

The study empirically shows that increased ICT investment increases ICT maturity levels of African countries, policies now need to be considered that broadly benefit all SME's equally. Pick *et al* maintain that diffusion of ICT infrastructure is strongly related to economic benefits. In this study we then add to his research by motivating that not all SME's benefit equally.

This premise exposes the existence of a greater economic opportunity by equally distributing the ICT infrastructure investment benefit, both urban and rural SME's will drive economic value through ICT maturity and advancement.

## **FUTURE RESEARCH AREA**

The study exposed that there exists a positive relationship between ICT infrastructure investment and the ICT maturity level of SME's in Africa.

The strength of the relationship has not been investigated. Further to this this study did not investigate the component factors to ICT maturity and how ICT infrastructure investment influences them individually.

This research area is of value as a future researcher might answer question like: for every \$1 invested in ICT infrastructure what is the return on value created in the economy.

Research in this area might expose a return on investment function that will drive future foreign direct investment and governmental spending on ICT infrastructure.

## CONCLUSION

The study set out to establish if increased information and communication technology infrastructure investment at the macro level improves the micro level ICT Maturity level within small and medium enterprises in Africa.

Further to this the study examined if urban SME's benefit more than rural SME's. The researcher examines urban and rural SME in terms of ICT maturity levels when there has been increased ICT infrastructure investment in the African country.

The study makes use of factor analysis to compose a composite index that measures the ICT maturity levels within SME's in Africa. Further to this it uses that composite index to do statistical tests on the means of samples to answer hypothesis based on the research questions posed.

The study finds that there is a significant difference in the ICT maturity level of small and medium businesses in African countries where there has been and increased level of ICT infrastructure investment. Furthermore the study finds that in those African countries where there has been increased ICT infrastructure investment urban SME's have higher ICT maturity level than rural SME's.

This study has important implications for governmental and private sector policy relating to ICT infrastructure investment. The study further also empirically could guide ICT investment towards rural SME's.



## 8. REFERENCES

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- Alkalbani, S., Rezgui, Y., Vorakulpipat, C., & Wilson, I. E. (2013). ICT adoption and diffusion in the construction industry of a developing economy: The case of the sultanate of Oman. *Architectural Engineering And Design Management*, 62 - 75.
- Ayanso, A., Cho, I. D., & Lertwachara, K. (2010). The digital divide: global and regional ICT leaders and followers. *Information Technology for Development Vol. 16, No. 4*, 304 - 319.
- Azari, R., & Pick, B. J. (2009). Understanding Global Digital Inequality: The Impact of Government, Investment in Business and Technology, and Socioeconomic Factors on Technology Utilization. *Hawaii International Conference on System Sciences 42nd*, (pp. 1 - 10).
- Bayo-Moriones, A., & Lera-Lopez, F. (2007). A firm-level analysis of determinants of ICT adoption in Spain. *Technovation* 27, 352–366.
- Blignaut, P. (2009). A Bilateral Perspective on the Digital Divide in South Africa. *Perspectives on global developments and technology*, 581 - 601.
- Bollou, F., & Ngwenyama, O. (2008). Are ICT Investments Paying Off in Africa? An Analysis of Total Factor Productivity in Six West African Countries from 1995 to 2002. *Information Technology for Development Vol. 14 (4)*, 294 - 307.
- Brown, D. H., & Thompson, S. (2011). Priorities, policies and practice of e-government in a developing country context: ICT infrastructure and diffusion in Jamaica. *European Journal of Information Systems*, 329 - 342.
- Bruno, G., Esposito, E., Genovese, A., & Gwebu, K. L. (2011). A Critical Analysis of Current Indexes for Digital Divide Measurement. *The Information Society*, 16 - 28.

- Cardona, M., Kretschmer, T., & Strobel, T. (2013). ICT and productivity: conclusions from the empirical literature. *Information Economics and Policy*, 109 - 125.
- Chircu, M. A., & Mahajan, V. (2009). Revisiting the Digital Divide: An Analysis of Mobile Technology Depth and Service Breadth in the BRIC Countries. *Product Innovation Management*, 455 - 466.
- Commander, S., Harrison, R., & Menezes-Filho, N. (2011). ICT AND PRODUCTIVITY IN DEVELOPING COUNTRIES: NEW FIRM-LEVEL EVIDENCE FROM BRAZIL AND INDIA. *The Review of Economics and Statistics* 93(2), 528-541.
- Dewan, S., Ganley, D., & Kraemer, K. L. (2005). Across the digital divide: A Cross-Country Analysis of Determinants of IT Penetration. *Journal of the Association for Information Systems* 6 (12), 409 - 432.
- Doong, S. H., & Ho, S.-C. (2012). The impact of ICT development on the global digital divide. *Electronic Commerce Research and Applications* 11, 518–533.
- Epstein, D., Nisbet, E. C., & Gillespie, T. (2011). Who's Responsible for the Digital Divide? Public Perceptions and Policy Implications. *The Information Society* Vol , 27, 92 - 104.
- Hanafizadeh, M. R., Saghaei, A., & Hanafizadeh, P. (2009). An index for cross-country analysis of ICT infrastructure and access. *Telecommunications Policy* 33, 385–405.
- Holmner, M., & Britz, J. (2011). THE ROAD LESS TRAVELLED: a critical reflection on infrastructure development in Africa from a perspective of the new economics of information. *Mousaion*, 1 - 16.
- Hyytinen, A., & Toivanen, O. (2011). Income Inequality and Technology Diffusion: Evidence from Developing Countries. *Journal of Economics*, 364 - 387.
- ICT Research Africa. (2012). *ICT Access and Usage Survey 2011 Methodology*. Retrieved 01 15, 2013, from Research ICT Africa:

<http://www.researchictafrica.net/docs/HH%20survey%20methodology%20brief.pdf>

- Igari, N. (2013). How to successfully promote ICT usage: A comparative analysis of Denmark and Japan. *Telematics and Informatics*, 115 - 125.
- James, J. (2011). Are Changes in the Digital Divide Consistent with Global Equality or Inequality? *The Information Society*, 121 - 128.
- James, J. (2012). The ICT Development Index and the digital divide: How are they related? *Technological Forecasting & Social Change* 79, 587–594.
- Jimoh, L., Pate, M. A., & Schulman, K. A. (2012). A model for the adoption of ICT by health workers in Africa. *International Journal of Medical Informatics*, 773 - 781.
- Kohlegger, M., Maier, R., & Thalmann, S. (2009). Understanding Maturity Models Results of a Structured Content Analysis. *I-KNOW, I-SEMANTICS* (pp. 51 - 61). Graz: University of Innsbruck, School of Management, Information Systems, Austria.
- Kwaku Kyem, P. A. (2012). Is ICT the panacea to sub-Saharan Africa's development problems? Rethinking Africa's contentious engagement with the global information society. *Progress in Development Studies* 12, 2&3, 231–244.
- Kyriakidou, V., Michalakelis, C., & Sphicopoulos, T. (2013). Assessment of information and communications technology maturity level. *Telecommunications Policy*, 48–62.
- Maij, E., Toussaint, P., Kalshoven, M., & Poerschke, M. (2002). Use cases and DEMO: aligning functional features of ICT infrastructure to business processes. *International Journal of Medical Informatics*, 179 - 191.
- Mamaghani, F. (2010). The Social and Economic Impact of Information and Communication Technology on Developing Countries: An Analysis. *International Journal of Management Vol. 27 No. 3 Part 2*, 607 - 615.

- Min, S.-J. (2010). From the Digital Divide to the Democratic Divide: Internet Skills, Political Interest, and the Second-Level Digital Divide in Political Internet Use. *Journal of Information Technology & Politics* Vol 7, 22 - 35.
- Nair, M., Han, G.-S., Lee, H., Goon, P., & Muda, R. (2012). Antecedents to Mobile Phone Diffusion in a Developing Economy: The Case of Malaysia. *International Journal of Management*, 205 - 227.
- Ngwenyama, O., & Morawczynski, O. (2009). Factors Affecting ICT Expansion in Emerging Economies: An Analysis of ICT Infrastructure Expansion in Five Latin American Countries. *Information Technology for Development* Vol. 15 (4), 237-258.
- Ogrea, C., Herciu, M., & Belascu, L. (2010). From technological readiness to business sophistication through ICT applications. *Research in Business and Economics*, 1 - 6.
- Omidinia, S., Masrom, M., & Selamat, H. (2011). Review of E-Learning and ICT Infrastructure in Developing Countries (Case Study of Iran). *American Journal of Economics and Business Administration*, 120 - 125.
- Pham, Q. T. (2010). Measuring The ICT Maturity Of SMEs. *Journal of Knowledge Management Practice*, 1 - 13.
- Pick, J. B., & Azari, R. (2008). Global Digital Divide: Influence of Socioeconomic, Governmental, and Accessibility Factors on Information Technology. *Information Technology for Development*, Vol. 14 (2), 91 - 115.
- Rojko, K., Lesjak, D., & Vehovar, V. (2011). Information communication technology spending in (2008-) economic crisis. *Industrial Management & Data Systems*, 391 - 409.
- Sassi, S., & Goaid, M. (2013). Financial development, ICT diffusion and economic growth: Lessons from MENA region. *Telecommunications Policy*, 252 - 261.

- Saunders, M., & Lewis, P. (2012). *Doing Research in Business & Management*. London: Pearson Education.
- Spanos, Y. P. (2002). The relationship between information and communication technology adoption and management. *Information and Management* 39 (8), 659 - 676.
- Teltscher, S., Magpantay, E., Gray, V., Olaya, D., & Vallejo, I. (2009). *Measuring the Information Society – The ICT Development Index*. Geneva: International Telecommunication Union.
- Teltscher, S., Magpantay, E., Vallejo, I., Kreuzenbeck, L., Korka, D., Gray, V., . . . Hilbert, M. (2012). *Measuring the Information Society*. Geneva: International Telecommunication Union.
- Verdegem, P., & DeMarez, L. (2011). Rethinking determinants of ICT acceptance: Towards an integrated and comprehensive overview. *Technovation*, 411–423.
- Vu, K. M. (2011). ICT as a source of economic growth in the information age: Empirical evidence from the 1996–2005 period. *Telecommunications Policy*, 357 - 372.
- Vu, K. M. (2013). Information and Communication Technology (ICT) and Singapore's economic growth. *Information Economics and Policy*, 284 - 300.
- Weber, D. M., & Kauffman, R. J. (2011). What drives global ICT adoption? Analysis and research directions. *Electronic Commerce Research and Applications* 10, 683–701.
- Weiers, R. M. (2008). *Introduction to Business Statistics*. Mason: South-Western Cengage Learning.
- Yunis, M. M., Koong, K. S., Liu, L. C., Kwan, R., & Tsang, P. (2012). ICT maturity as a driver to global competitiveness: a national level analysis. *International Journal of Accounting and Information Management*, 255 - 281.

## 9. APPENDIX A RESEARCH ICT AFRICA BUSINESS SURVEY VARIABLES

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Variable ID	Variable Description
Weight	Apply to gross up to national level
RIA_ID	RIA ID
Serial_Id	Serial Id
A.5	COUNTRY
MM.1F.997	QMM1F. what means of sending and receiving does the business use - Other - Others
RIA	RIA
A.6	Location
D.1	Form of ownership?
D.1.1	Other (Specify)
D.2	Please describe in a few words the business activity :
D.3	Is your Business registered with any local authority or municipality?
D.4	Does your business pay tax on its profits?
D.5	Does Your Business pay local or municipal taxes (tax stamps etc)
D.6	Is your business Registered for VAT or sales tax?
D.7	In what year was this business established?
D.8	How was the start up capital financed
D.9.B	Part-time: How many Employees does your business have (excl. owners)?
D.9.C	Occasional: How many Employees does your business have (excl. owners)?
D.9.D	Unpaid Family members: How many Employees does your business have (excl. owners)?
D.10	Gender of Owner(s)
D.10.A	Men: How many Owners does your business have?
D.10.B	Women: How many Owners does your business have?
D.11	Does the business premises have electricity
D.12	Who manages the business?
D.12.1	other (specify):
D.13	Highest formal educational level of the business owners? (if more than 1 owner, choose the owner with the highest education level)
D.14	Highest formal educational level of the business manager?
D.15	How many of your employees have a WRITTEN EMPLOYMENT contract?
D.16	Does your business strictly separate business finances from personal finances?
D.18	Does your business keep financial records?
ReD.1	Ownership Recoded
ReD.4	Tax on Profits recoded
ReD.6	VAT Registration recoded
ReD.15	Written Employment Contract recoded
ReD.16	Separation of Finances recoded
ReD.18	Financial Records recoded
D.17	What were the main reasons to start a business for you?
ReD.17	Push and Pull Classification
D.19	Are these records for your own planning or for the revenue authorities
D.20	Does your business have a postal box, can it receive mail?
D.21	Does your business have a website?
D.22	Does your business provide email addresses to employees
D.23	How do you advertise? Radio
D.24	How do you advertise? TV
D.25	How do you advertise? Newspapers
D.26	How do you advertise? Mobile Phone SMS
D.27	How do you advertise? Twitter Facebook
S.1	How many key suppliers does your business have

- S.3 What is the size of the most important suppliers?
- S.4 Does the business have suppliers located in other countries
- S.5 How long have you been doing business with the most important suppliers
- S.6 How reliable are the suppliers?
- S.7.A Cash: How does your business transact financially with SUPPLIERS
- S.7.B Check: How does your business transact financially with SUPPLIERS
- S.7.C Credit card: How does your business transact financially with SUPPLIERS
- S.7.D Bank account transfer: How does your business transact financially with SUPPLIERS
- S.7.E Online banking: How does your business transact financially with SUPPLIERS
- S.7.F Mobile Money transfers: How does your business transact financially with SUPPLIERS
- S.7.G Letter of Credit: How does your business transact financially with SUPPLIERS
- S.7.H Western Union/MoneyGram: How does your business transact financially with SUPPLIERS
- S.7.I Send money with someone: How does your business transact financially with SUPPLIERS
- S.8 How often do you communication with your most important suppliers
- S.9.A Mobile Phone: Does the Business communicate with the most important supplier with any of the following:
- S.9.B Land Line: Does the Business communicate with the most important supplier with any of the following:
- S.9.C Email: Does the Business communicate with the most important supplier with any of the following:
- S.9.D SMS: Does the Business communicate with the most important supplier with any of the following:
- S.9.E Fax: Does the Business communicate with the most important supplier with any of the following:
- S.9.F In person: Does the Business communicate with the most important supplier with any of the following:
- S.10 What is the preferred mode of communicating of the business with suppliers?
- S.11 Does the business have a line of credit facility with suppliers
- C.3 Does the business have customers located in other countries?
- C.4 What is the type of customers does the business have?
- C.6 How long have you been doing business with your most important customers
- C.7.A A: Cash How does the business transact financially with customers
- C.7.B B: Check How does the business transact financially with customers
- C.7.C C: Credit card How does the business transact financially with customers
- C.7.D D: Bank account transfer How does the business transact financially with customers
- C.7.E E: Online banking How does the business transact financially with customers
- C.7.F F: Mobile Money transfers How does the business transact financially with customers
- C.7.G G: Letter of Credit How does the business transact financially with customers
- C.7.H H: Western Union/MoneyGram How does the business transact financially with customers
- C.7.I I: send money with someone How does the business transact financially with customers
- C.9.A A: Mobile Phone Does the Business communicate with the most important customers with any of the following:
- C.9.B B: Land Line Does the Business communicate with the most important customers with any of the following:
- C.9.C C: Email Does the Business communicate with the most important customers with any of the following:
- C.9.D D: SMS Does the Business communicate with the most important customers with any of the following:
- C.9.E E: Fax Does the Business communicate with the most important customers with any of the following:

- C.9.F F: In person Does the Business communicate with the most important customers with any of the following:
- C.10 What is the preferred mode of communicating of the business with customers?
- C.11 Do you offer your customers a credit line facility
- FI.1 Does your business have a working Fixed-line telephone connection
- FI.2 How many working Fixed-line telephone connections does your business have?
- FI.3 How many working fax machines does your business have?
- FI.4 Annual cost of Fixed-line Access and Usage
- FI.5 How important is the usage of a fixed-line phone for your business activities?
- FI.6 If your business does not have a fixed-line phone why not?
- FI.6.1 Other please specify
- FI.7 Do you plan to use it in the future?
- Fi.8 How much would the business be willing and able to spend on a fixed-line phone in a month
- M.1 Does your business use mobile phones for business purposes?
- M.2 Does the business Manager have a mobile?
- M.3 Does the business send SMS or text messages for business purposes?
- M.4 Does the business receive SMS or text messages for business purposes?
- M.5 For what main purposes does the business use SMS or text messages (multiple responses)?
- M.5.1 Other, please specify
- M.6 Monthly cost of Mobile Access and Usage
- M.7 How important is the usage of the mobile phone for business activities?
- M.7b Does the business compensate its employees for airtime used on personal phones for business purposes
- M.7c How many employees have a mobile
- M.8 If your business does not use mobiles for business purposes, what is the main reason?
- M.8.1 Other please specify:
- M.9 Is your business planning to use mobile phones in future?
- M.10 To conduct my business activities I prefer to use...
- M.10.1 Other please specify:
- CO.1 Does the business own any computers
- CO.2 How many working Computers does your business have?
- CO.3 Does your business have a local area network (LAN)
- CO.4 Does your business have an intranet?
- CO.5 Does your business have an Extranet?
- CO.6 Does your company make use of Inventory Control Software?
- CO.7 Does your company use Anti-Virus software
- CO.8 HOW MANY PERSONS EMPLOYED IN YOUR BUSINESS ROUTINELY USE A COMPUTER AT WORK
- CO.8.1 How many persons employed in your business routinely used a computer at work
- CO.8.2 How many persons employed in your business routinely used a computer at work %
- CO.9A Owners Who can use it?
- CO.9B Managers Who can use it?
- CO.9C Employees Who can use it?
- CO.9D Customers Who can use it?
- CO.9E Family and Friends Who can use it?
- CO.10 What is the Annual expenditure on Hardware and Software of the business? (local currency)
- CO.11 How important is the usage of computers for your business activities?
- CO.12B CO11b. Do you have plans to purchase more computers in 2012? No=0.....Yes=1..No info=9
- CO.13C CO.11c If Yes, how many computers do you plan to buy in 2012?
- CO.12.A Why does the business not have computers? too expensive
- CO.12.B Why does the business not have computers? No need
- CO.12.C Other please specifies Why does the business not have computers?



- CO.12a Why does the business not have computers?CO.12A: Too expensive, 0 = No 1 = Yes SKIP IF  
CO.1=1CO.12B: No need 0 = No 1 = YesCO.12C: other please specify: - CO.12C Other  
.....0= No ...
- CO.12.D
- CO.13 Does your business plan to use it in the future?
- CO.14 How much would the business be willing and able to spend for a computer?
- Bs.1 Have you ever attended formal training to improve your business skills?
- Bs.2 NGO, non-for-profit organisation: who organised the training?
- Bs.3 Government agency/Municipality: who organised the training?
- Bs.4 Community centre: who organised the training?
- Bs.5 Trade Union: who organised the training?
- Bs.6 Other, please specify: who organised the training?
- Bs.6coded Other, please specify: who organised the training?
- BS.2 WHO ORGANISED THE TRAINING?BS.2 NGO, non-for-profit organisation 0 = No 1 = YesBS.3  
Government agency/Municipality 0 = No 1 = YesBS.4 Community centre 0 = No 1 = YesBS.5 Trade Union 0 =  
No 1 = YesBS.6 Other - BS.6 Other
- Bs.6\_2
- Bs.7 Business centre/Incubator/Community centre: Who do you rely on for tips and advises on how to run and  
improve your business?
- Bs.8 Local NGO/Non-for-profit organisation: Who do you rely on for tips and advises on how to run and improve your  
business?
- Bs.9 Family & Friends: Who do you rely on for tips and advises on how to run and improve your business?
- Bs.10 TV: Who do you rely on for tips and advises on how to run and improve your business?
- Bs.11 Radio: Who do you rely on for tips and advises on how to run and improve your business?
- Bs.12 Internet: Who do you rely on for tips and advises on how to run and improve your business?
- Bs.13 Other (please specify: Who do you rely on for tips and advises on how to run and improve your business?)
- I.1 Does your business have internet access?
- I.1a Narrow Band (Modem dial up, ADSL 256K or below) What type of internet access?
- I.1b Fixed Broadband (egg ADSL above 256k speed) What type of internet access?
- I.1c Mobile Broadband (3G, wireless) What type of internet access?
- I.1d Other Please specify: What type of internet access?
- I.1e1 Owners Who can use it?
- I.1e2 Managers Who can use it?
- I.1f Employees Who can use it?
- I.2 Does the business Manager have an email address?
- I.3 How many persons employed in your business routinely use the Internet at work?
- I.4a Owners Who can use it?
- I.4b Managers Who can use it?
- I.4c Employees Who can use it?
- I.4d Customers Who can use it?
- I.4e Family and Friends Who can use it?
- I.5.A A: Sending and receiving email What do you use the Internet for :
- I.5.B B: Telephoning over the Internet VoIP Skype What do you use the Internet for :
- I.5.C C: Getting information about goods and services What do you use the Internet for :
- I.5.D D: Getting information from government organisations What do you use the Internet for :
- I.5.E E: Interacting with government organisations What do you use the Internet for :
- I.5.F F: Internet banking What do you use the Internet for :
- I.5.G G: Providing customer services What do you use the Internet for :
- I.5.H H: Delivering products online What do you use the Internet for :
- I.5.I I: Internal or external recruitment What do you use the Internet for :
- I.5.J J: Staff training e-learning What do you use the Internet for :
- I.6 Has the business received orders via the Internet?
- I.7 Has the business purchased products/services via the Internet?

- I.8 What are in your opinion the potential obstacles to a wider use of the Internet for business purposes (e-commerce)?
- I.9 The Internet helps the businesses increase sales volume and customers What are the perceived benefits of Internet use for you: I will read the following statements, please tell me
- I.9\_01 What are the perceived benefits of internet use for you: The internet helps the business increases sales volumes and customers
- I.9\_02 What are the perceived benefits of internet use for you: The internet helps the business keep pace with competition
- I.9\_03 What are the perceived benefits of internet use for you: The internet helps widen the supplier network
- I.9\_04 What are the perceived benefits of internet use for you: The internet helps the business understand customers better
- I.10 The Internet helps the business keep pace with competition What are the perceived benefits of Internet use for you: I will read the following statements, please tell me
- I.11 The Internet helps Widen the supplier network What are the perceived benefits of Internet use for you: I will read the following statements, please tell me
- I.12 The Internet helps the business understand customers better What are the perceived benefits of Internet use for you: I will read the following statements, please tell me
- I.13 can you estimate your Annual cost of Internet Access and Usage
- I.14 How important is the use of the Internet for your business activities?
- I.15a Too expensive Why does your business not have Internet Access?
- I.15b No need Why does your business not have Internet Access?
- I.15c Not available Why does your business not have Internet Access??
- I.15d Use Public Internet access: Internet cafe egg Why does your business not have Internet Access??
- I.15e Internet is too slow to use it Why does your business not have Internet Access?
- I.15f No knowledge about it
- I.15fcoded Other please specify
- I.15.F.102 Why does your business not have Internet Access? - Other - I don't know how to use/operate it.
- I.15.F.103 Why does your business not have Internet Access? - Other - No need for it.
- I.15.F.104 Why does your business not have Internet Access? - Other - No power/electricity
- I.15.F.105 Why does your business not have Internet Access? - Other - The network is very poor.
- I.15.F.106 Why does your business not have Internet Access? - Other - can't afford
- I.15.F.201 Why does your business not have Internet Access? - Other - Services not available in our area
- I.15.F.202 Why does your business not have Internet Access? - Other - Have never used it
- I.15.F.203 Why does your business not have Internet Access? - Other - My customers are within the area
- I.15.F.204 Why does your business not have Internet Access? - Other - Don't know how to use it
- I.15.F.205 Why does your business not have Internet Access? - Other - Low income
- I.15.F.206 Why does your business not have Internet Access? - Other - No internet connection
- I.15.F.301 Why does your business not have Internet Access? - Other - Don't have a time to use the service
- I.15.F.302 Why does your business not have Internet Access? - Other - Don't have interest in using internet services
- I.15.F.303 Why does your business not have Internet Access? - Other - Don't know how to use it
- I.15.F.304 Why does your business not have Internet Access? - Other - Don't know the meaning of internet services
- I.15.F.305 Why does your business not have Internet Access? - Other - Low business but I will use it later

- I.15.F.306 Why does your business not have Internet Access? - Other - Low circulation of money
- I.15.F.401 Why does your business not have Internet Access? - Other - No knowledge about it
- I.15.F.501 Why does your business not have Internet Access? - Other - LESS/LITTLE INCOME
- I.15.F.502 Why does your business not have Internet Access? - Other - I DON'T HAVE THE KNOW HOW
- I.15.F.997 Why does your business not have Internet Access? - Other - Others
- I.15.F.998 Why does your business not have Internet Access? - Other - Nothing
- I.15.F.999 Why does your business not have Internet Access? - Other - DK
- I.15A WHY DOES YOUR BUSINESS NOT HAVE INTERNET ACCESS? I.15A Too expensive.....0 = No 1 = Yes I.15B No need.....0 = No 1 = Yes I.15C Not
- I.15g Do you plan to use it in the future?
- I.16 Do you plan to use it in the future?
- I.17 How much would the business be willing and able to spend on Internet access in a month
- B.1 Does your business have a bank account?
- B.2 What type of bank account
- B.2.1 WHAT TYPE OF BANK ACCOUNT - 1 Current account
- B.2.2 WHAT TYPE OF BANK ACCOUNT - 2 Savings account
- B.2.3 WHAT TYPE OF BANK ACCOUNT - 3 Other, please specify
- B.3 how long have you been banking with your current Bank
- B.4 Does the business have a corporate credit Card
- B.5 Does the business currently have a business loan from a Bank
- B.6 Was the business ever rejected FOR a business Loan from a Bank
- B.7 If yes in B.6 why?
- b.7.1 If yes in b.6 why? - - I could not meet up with the guarantee required by the bank
- b.7.2 If yes in b.6 why? - - the interest rate offer was too high
- b.7.3 If yes in b.6 why? - - others
- B.7\_01 If yes in B.6 why?-Credit risk
- B.7\_02 If yes in B.6 Why? - Don't qualify for a loan
- B.7\_03 If yes in B.6Why? - Not given a reason
- B.7\_48 Others
- B.7\_49 None
- B.7\_50 Don't know
- B.8 Did you ever decide not to accept a loan from a Bank
- B.9 Does the business have an overdraft with the bank
- B.10 How often do you communicate with your bank
- B.11 Have you purchased an insurance for your BUSINESS
- B.12 Does the bank used by the business offer internet banking services
- B.13 Does the bank used by the business offer mobile banking services
- B.14 Our bank understands Our business Needs and offers the financial facilities we need: I will read some statements to you please tell me whether you agree or disagree
- B.16 We are unhappy with the services offered by my bank: I will read some statements to you please tell me whether you agree or disagree
- B.17 We are considering changing to another bank: I will read some statements to you please tell me whether you agree or disagree
- B.18 Our bank is expensive: I will read some statements to you please tell me whether you agree or disagree
- B.19 Our banks services are slow: I will read some statements to you please tell me whether you agree or disagree
- B.20 We spend too much time at our bank: I will read some statements to you please tell me whether you agree or disagree
- B.20b I don't understand the fees and charges: I will read some statements to you please tell me whether you agree or disagree
- B.20c The next branch is too far away: I will read some statements to you please tell me whether you agree or disagree

- B.21.A A: business does not need a bank account  
 B.21.B B: banks would not provide my business with an account  
 B.21.C C: bank accounts are too expensive to maintain  
 B.21.E other, please specify  
 B.21.Ecoded Other, please specify
- B.21.F B.21 WHY DOES YOUR BUSINESS NOT USE A BANK ACCOUNTB.21A: BUSINESS DOES NOT NEED A BANK ACCOUNT..... 0 = No 1 = Yes: BANKS WOULD NOT PROVIDE MY BUSINESS WITH AN ACCOUNT.....0 = No 1 = YesC: BANK ACCOUNTS ARE TOO EXPENSIVE
- B.21.4.101 Why does your Business not use a bank account - other - Am likely to get one soon
- B.21.4.102 Why does your Business not use a bank account - other - Banks are not available in my area.
- B.21.4.103 Why does your Business not use a bank account - other - Business is still new/just started
- B.21.4.104 Why does your Business not use a bank account - other - Don't have enough money to save
- B.21.4.105 Why does your Business not use a bank account - other - Don't know how it operates/Lack of knowledge
- B.21.4.106 Why does your Business not use a bank account - other - Don't understand/know benefits to business people
- B.21.4.107 Why does your Business not use a bank account - other - For personal use/home use
- B.21.4.108 Why does your Business not use a bank account - other - I don't trust financial institutions.
- B.21.4.109 Why does your Business not use a bank account - other - I haven't tried to get one/ I see no use for it
- B.21.4.110 Why does your Business not use a bank account - other - My business is small
- B.21.4.111 Why does your Business not use a bank account - other - Prefer keeping my money on my own?
- B.21.4.112 Why does your Business not use a bank account - other - Their rates/charges are very high.
- B.21.4.113 Why does your Business not use a bank account - other - To get a bank account I need the registration of my business.
- B.21.4.114 Why does your Business not use a bank account - other - Use profits, gains, savings to restock business
- B.21.4.115 Why does your Business not use a bank account - other - I use someone else's account
- B.21.4.116 Why does your Business not use a bank account - other - No time for banks
- B.21.4.117 Why does your Business not use a bank account - other - Have a personal/private account
- B.21.4.201 Why does your Business not use a bank account - other - Bank is too far/ not available
- B.21.4.202 Why does your Business not use a bank account - other - Business is small
- B.21.4.203 Why does your Business not use a bank account - other - Business is still new to have an account
- B.21.4.204 Why does your Business not use a bank account - other - Don't have enough money to save/Less income
- B.21.4.205 Why does your Business not use a bank account - other - Use a personal account
- B.21.4.206 Why does your Business not use a bank account - other - Will open one in future
- B.21.4.301 Why does your Business not use a bank account - other - Bank is far/not available in my area
- B.21.4.302 Why does your Business not use a bank account - other - I am not qualified to open bank account
- B.21.4.303 Why does your Business not use a bank account - other - I am saving my money on my own (home, hidden place)
- B.21.4.304 Why does your Business not use a bank account - other - I am using mobile phone account

- B.21.4.305 Why does your Business not use a bank account - other - Long time in the line and higher concentration of customers in the bank
- B.21.4.306 Why does your Business not use a bank account - other - Low business but I will use it later
- B.21.4.307 Why does your Business not use a bank account - other - Low capital/Not enough capital to open bank account
- B.21.4.308 Why does your Business not use a bank account - other - Providing loans to my fellows
- B.21.4.401 Why does your Business not use a bank account - other - I use a personal account
- B.21.4.402 Why does your Business not use a bank account - other - Planning on getting one
- B.21.4.403 Why does your Business not use a bank account - other - Banks are far from my area
- B.21.4.404 Why does your Business not use a bank account - other - Not enough money to save
- B.21.4.405 Why does your Business not use a bank account - other - No need
- B.21.4.406 Why does your Business not use a bank account - other - No knowledge about them
- B.21.4.501 Why does your Business not use a bank account - other - Have little/less income, money to deposit/Don't save money
- B.21.4.502 Why does your Business not use a bank account - other - Use a personal account
- B.21.4.503 Why does your Business not use a bank account - other - I don't know how to open an account
- B.21.4.504 Why does your Business not use a bank account - other - Bank is far
- B.21.4.505 Why does your Business not use a bank account - other - Recently established/newly opened
- B.21.4.506 Why does your Business not use a bank account - other - Used as working money/capital
- B.21.4.507 Why does your Business not use a bank account - other - Use profit for personal use/family use
- B.21.4.508 Why does your Business not use a bank account - other - Our sales is small
- B.21.4.509 Why does your Business not use a bank account - other - I don't have the habit of using this service
- B.21.4.510 Why does your Business not use a bank account - other - I don't need it at all
- B.21.4.511 Why does your Business not use a bank account - other - there is no service giver in our village
- B.21.4.997 Why does your Business not use a bank account - other - Others
- B.21.4.998 Why does your Business not use a bank account - other - Nothing
- B.21.4.999 Why does your Business not use a bank account - other - DK
- MM.1a Mobile Money: what means of sending and receiving does the business use
- MM.1b Post Office: what means of sending and receiving does the business use
- MM.1c Western Union/MoneyGram etc.: what means of sending and receiving does the business use
- MM.1d Bank: what means of sending and receiving does the business use
- MM.1e send cash with someone: what means of sending and receiving does the business use
- MM.1f Other, please specify
- MM.1fcoded Other please specify
- MM.1F.101 What means of sending and receiving does the business use - Other - In person/Cash at hand.
- MM.1F.102 what means of sending and receiving does the business use - Other - Customers bring money themselves
- MM.1F.201 what means of sending and receiving does the business use - Other - Cash in hand
- MM.1F.202 what means of sending and receiving does the business use - Other - Pay in person
- MM.1F.203 what means of sending and receiving does the business use - Other - Receive cash from customer

MM.1F.301	what means of sending and receiving does the business use - Other - Played myself
MM.1F.302	what means of sending and receiving does the business use - Other - Gong (update)
MM.1F.303	what means of sending and receiving does the business use - Other - Saving money in my small money box (KIBUBU)
MM.1F.401	What means of sending and receiving does the business use - Other - In person/Cash at hand.
MM.1F.501	what means of sending and receiving does the business use - Other - In person
MM.1F.998	what means of sending and receiving does the business use - Other - Nothing
MM.1F.999	what means of sending and receiving does the business use - Other - DK
MM.2	What means of sending and receiving does the business use the most?
MM.3	does the business send or receive money via mobile phones (mobile money - mobile money transfer such as MPESA or Mob pay)
MM.4	which mobile money providers does the business use
MM.4_01	Which mobile money providers does the business use
MM.4_02	FNB
MM.4_03	Barclays
MM.4_04	Masco
MM.4_05	E Wallet
MM.4.6	WHICH MOBILE MONEY PROVIDERS DOES THE BUSINESS USE? - TIGO
MM.4.7	WHICH MOBILE MONEY PROVIDERS DOES THE BUSINESS USE? - Z-PESA
MM.4.8	WHICH MOBILE MONEY PROVIDERS DOES THE BUSINESS USE? - ZAP
MM.4.9	WHICH MOBILE MONEY PROVIDERS DOES THE BUSINESS USE? - M-PESA
MM.4.10	WHICH MOBILE MONEY PROVIDERS DOES THE BUSINESS USE? - MTN MOBILE MONEY
MM.4.11	WHICH MOBILE MONEY PROVIDERS DOES THE BUSINESS USE? - TIGO CASH
MM.4.12	WHICH MOBILE MONEY PROVIDERS DOES THE BUSINESS USE? - M PESA
MM.4.13	WHICH MOBILE MONEY PROVIDERS DOES THE BUSINESS USE? - MTN MOBILE MONEY
MM.4.14	WHICH MOBILE MONEY PROVIDERS DOES THE BUSINESS USE? - M SENTE MOBILE MONEY
MM.4.15	WHICH MOBILE MONEY PROVIDERS DOES THE BUSINESS USE? - AIRTEL MONEY
MM.4.16	WHICH MOBILE MONEY PROVIDERS DOES THE BUSINESS USE? - M PESA
MM.4_50	Other
MM.4.998	WHICH MOBILE MONEY PROVIDERS DOES THE BUSINESS USE? - Nothing
MM.4.999	WHICH MOBILE MONEY PROVIDERS DOES THE BUSINESS USE? - DK
MM.5	how long has the business been using mobile money transfers for transactions with Suppliers (months)
MM.6a	how long has the business been using mobile money transfers for transactions with customers
MM.6b	What was the major reason that led to the business to start using Mobile Money?
MM.6b_01	What was the major reason that led to the business to start using mobile money? saves time/convenient
MM.6b_02	What was the major reason that led to the business to start keep up to date
MM.6b_03	MM.6B WHAT WAS THE MAJOR REASON THAT LED TO THE BUSINESS TO START USING MOBILE MONEY? - Not answered
MM.6b_48	MM.6B WHAT WAS THE MAJOR REASON THAT LED TO THE BUSINESS TO START USING MOBILE MONEY? - 48
MM.6b_49	MM.6B WHAT WAS THE MAJOR REASON THAT LED TO THE BUSINESS TO START USING MOBILE MONEY? - 49
MM.6b_50	MM.6B WHAT WAS THE MAJOR REASON THAT LED TO THE BUSINESS TO START USING MOBILE MONEY? - No info
MM.6.B.7	WHAT WAS THE MAJOR REASON THAT LED TO THE BUSINESS TO START USING MOBILE MONEY? - It is time saving/fast
MM.6.B.8	WHAT WAS THE MAJOR REASON THAT LED TO THE BUSINESS TO START USING MOBILE MONEY? - Reduction on movements.
MM.6.B.9	WHAT WAS THE MAJOR REASON THAT LED TO THE BUSINESS TO START USING MOBILE MONEY? - To make payments

- MM.6.B.10 WHAT WAS THE MAJOR REASON THAT LED TO THE BUSINESS TO START USING MOBILE MONEY? - To easily buy and sell the products.
- MM.6.B.11 WHAT WAS THE MAJOR REASON THAT LED TO THE BUSINESS TO START USING MOBILE MONEY? - To make my work easier/It simplifies work.
- MM.6.B.12 WHAT WAS THE MAJOR REASON THAT LED TO THE BUSINESS TO START USING MOBILE MONEY? - To receive money from customers
- MM.6.B.13 WHAT WAS THE MAJOR REASON THAT LED TO THE BUSINESS TO START USING MOBILE MONEY? - To save on or reduce on transport costs.
- MM.6.B.101 WHAT WAS THE MAJOR REASON THAT LED TO THE BUSINESS TO START USING MOBILE MONEY? - Cheap in money transaction.e.g paying suppliers,debt collection..
- MM.6.B.102 WHAT WAS THE MAJOR REASON THAT LED TO THE BUSINESS TO START USING MOBILE MONEY? - More safe / secure.
- MM.6.B.103 WHAT WAS THE MAJOR REASON THAT LED TO THE BUSINESS TO START USING MOBILE MONEY? - Alternative to hard cash.
- MM.6.B.104 WHAT WAS THE MAJOR REASON THAT LED TO THE BUSINESS TO START USING MOBILE MONEY? - Saves time / Fast especially in distance transactions.
- MM.6.B.105 WHAT WAS THE MAJOR REASON THAT LED TO THE BUSINESS TO START USING MOBILE MONEY? - Conviniient / Easily available.
- MM.6.B.201 WHAT WAS THE MAJOR REASON THAT LED TO THE BUSINESS TO START USING MOBILE MONEY? - A way of earning income
- MM.6.B.202 WHAT WAS THE MAJOR REASON THAT LED TO THE BUSINESS TO START USING MOBILE MONEY? - Easy to use
- MM.6.B.203 WHAT WAS THE MAJOR REASON THAT LED TO THE BUSINESS TO START USING MOBILE MONEY? - Easy to make payments eg to distributors, suppliers
- MM.6.B.204 WHAT WAS THE MAJOR REASON THAT LED TO THE BUSINESS TO START USING MOBILE MONEY? - Simple to receive money
- MM.6.B.205 WHAT WAS THE MAJOR REASON THAT LED TO THE BUSINESS TO START USING MOBILE MONEY? - Simplify relationship between me and my customers
- MM.6.B.206 WHAT WAS THE MAJOR REASON THAT LED TO THE BUSINESS TO START USING MOBILE MONEY? - Simplify transportation costs and on time availability of products
- MM.6.B.207 WHAT WAS THE MAJOR REASON THAT LED TO THE BUSINESS TO START USING MOBILE MONEY? - To save money from my business
- MM.6.B.301 WHAT WAS THE MAJOR REASON THAT LED TO THE BUSINESS TO START USING MOBILE MONEY? - It is easy to use
- MM.6.B.302 WHAT WAS THE MAJOR REASON THAT LED TO THE BUSINESS TO START USING MOBILE MONEY? - Most of my suppliers use it
- MM.6.B.303 WHAT WAS THE MAJOR REASON THAT LED TO THE BUSINESS TO START USING MOBILE MONEY? - To make payments easy
- MM.6.B.304 WHAT WAS THE MAJOR REASON THAT LED TO THE BUSINESS TO START USING MOBILE MONEY? - It is cheap
- MM.6.B.305 WHAT WAS THE MAJOR REASON THAT LED TO THE BUSINESS TO START USING MOBILE MONEY? - It is fast
- MM.6.B.306 WHAT WAS THE MAJOR REASON THAT LED TO THE BUSINESS TO START USING MOBILE MONEY? - It is safe
- MM.6.B.307 WHAT WAS THE MAJOR REASON THAT LED TO THE BUSINESS TO START USING MOBILE MONEY? - for business purpose
- MM.6.B.308 WHAT WAS THE MAJOR REASON THAT LED TO THE BUSINESS TO START USING MOBILE MONEY? - To send and receive money
- MM.6.B.997 WHAT WAS THE MAJOR REASON THAT LED TO THE BUSINESS TO START USING MOBILE MONEY? - Others
- MM.6.B.998 WHAT WAS THE MAJOR REASON THAT LED TO THE BUSINESS TO START USING MOBILE MONEY? - Nothing
- MM.6.B.999 WHAT WAS THE MAJOR REASON THAT LED TO THE BUSINESS TO START USING MOBILE MONEY? - DK
- MM.7.A A: paying employees: The business uses mobile money for
- MM.7.B B: paying insurance: The business uses mobile money for
- MM.7.C C: paying suppliers: The business uses mobile money for

MM.7.D	D: paying bills: The business uses mobile money for
MM.7.E	e: paying taxes: The business uses mobile money for
MM.7.F	F: paying pension fund contributions: The business uses mobile money for
MM.7.G	G: receiving payments from customers: The business uses mobile money for
MM.7.H	h: Other, please specify
MM.9	what is the largest amount sent with the mobile phone to settle business payments?
MM.10	what is the largest amount received through the mobile phone for business purposes?
MM.11	would the business send higher mobile amounts if that was allowed
MM.12	would the business receive higher mobile money amounts if that was allowed
MM.13	how much money does the business send on average per business transaction
MM.14	how much money does the business receive on average per business transaction
MM.15	How often does the business make payments by Mobile Phone
MM.16	How often does the business receive payments through the Mobile phone
MM.17	Does mobile Money transfer system responds to business needs
MM.18	Mobile Money helps the business to save transport costs
MM.19	Mobile Money helps the Business get access to loans
MM.20	Mobile Money helps the business better manage the cash flow
MM.21	mobile money helps the business pay suppliers more easily
MM.22	if the supplier gets paid faster, the business gets the goods faster and hence can deliver to customers faster
MM.23	Mobile money did not make any difference in the way we conduct business
MM.24	mobile money helps the business recover money from customers much faster
MM.26	sales increased since the business used mobile money
MM.27	credit exposure to customers was reduced since the business started using mobile money
MM.28	the business use mobile money to pay suppliers from outside my city
MM.29	sending and receiving money with mobile money reduced banking transactions
MM.30	it would help the business if i could use mobile money to pay suppliers from other countries.
MM.31	I trust that my business information are safe with the use of mobile Money services
MM.32	Agents capacity to hold cash and float are two main barriers for businesses
MM.33	Agents are far from my location
MM.34	mobile money allow s the business to reach more customers
MM.35	Mobile money has improved the efficiency of the business
MM.36	Agents opening hours are not convenient
MM.37	Agents only allow me to make small transactions
MM.38	Why does the business not use mobile money:
MM.38_01	Why does the business not use mobile money:No need/not needed
MM.38_02	Never heard of it/Don't know what is it
MM.38_03	Too complicated/Don't know how to use it/Don't understand it
MM.38_04	Prefer bank/Bank more convenient
MM.38_05	Business too small/Business still new
MM.38_06	Not interested
MM.38_07	Expensive/Can't afford it
MM.38_08	Not safe/don't trust it
MM.38_09	Don't have money to send
MM.38_10	Bank doesn't offer this service
MM.38_11	Have not registered yet
MM.38_12	Do not like the service
MM.38_13	No access to it/not available in my area
MM.38_14	Bank won't give street vendors this service
MM.38_15	MM.38 WHY DOES THE BUSINESS NOT USE MOBILE MONEY - Don't know
MM.38_16	MM.38 WHY DOES THE BUSINESS NOT USE MOBILE MONEY - Not answered
MM.38_47	
MM.38_48	Not answered

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MM.38_49	Others
MM.38_50	Don't know
MM.38.21	WHY DOES THE BUSINESS NOT USE MOBILE MONEY: - Not sure about its safety
MM.38.22	WHY DOES THE BUSINESS NOT USE MOBILE MONEY: - Our suppliers have bank accounts
MM.38.23	WHY DOES THE BUSINESS NOT USE MOBILE MONEY: - The income earned is too low to be sent or received through mobile money.
MM.38.24	WHY DOES THE BUSINESS NOT USE MOBILE MONEY: - We have just started the business but hope to use it with time.
MM.38.25	WHY DOES THE BUSINESS NOT USE MOBILE MONEY: - It takes time
MM.38.101	WHY DOES THE BUSINESS NOT USE MOBILE MONEY: - Prefers / Easy to carry cash .
MM.38.102	WHY DOES THE BUSINESS NOT USE MOBILE MONEY: - Small business / deals with little amount of money/Young business
MM.38.103	WHY DOES THE BUSINESS NOT USE MOBILE MONEY: - Phone is expensive / I don't have a phone.
MM.38.104	WHY DOES THE BUSINESS NOT USE MOBILE MONEY: - Use bank for cash transfers.
MM.38.105	WHY DOES THE BUSINESS NOT USE MOBILE MONEY: - Lack of interest/No need
MM.38.106	WHY DOES THE BUSINESS NOT USE MOBILE MONEY: - Not a registered mobile money user.
MM.38.107	WHY DOES THE BUSINESS NOT USE MOBILE MONEY: - Lack of / too far from money transfer agent.
MM.38.108	WHY DOES THE BUSINESS NOT USE MOBILE MONEY: - High transaction charges / Expensive.
MM.38.109	WHY DOES THE BUSINESS NOT USE MOBILE MONEY: - Customers don't use it.
MM.38.110	WHY DOES THE BUSINESS NOT USE MOBILE MONEY: - Lack of knowlegde in mobile money transfer.
MM.38.111	WHY DOES THE BUSINESS NOT USE MOBILE MONEY: - Customers are easy to reach.
MM.38.112	WHY DOES THE BUSINESS NOT USE MOBILE MONEY: - Lack of trust in mobile money transfer.
MM.38.113	WHY DOES THE BUSINESS NOT USE MOBILE MONEY: - No / poor network connection.
MM.38.114	WHY DOES THE BUSINESS NOT USE MOBILE MONEY: - Customers avoid the extra mobile money charges
MM.38.201	WHY DOES THE BUSINESS NOT USE MOBILE MONEY: - Don't believe/trust their services
MM.38.202	WHY DOES THE BUSINESS NOT USE MOBILE MONEY: - Don't know how to use this service
MM.38.203	WHY DOES THE BUSINESS NOT USE MOBILE MONEY: - Don't have mobile phone
MM.38.204	WHY DOES THE BUSINESS NOT USE MOBILE MONEY: - Don't see importance of using these services
MM.38.205	WHY DOES THE BUSINESS NOT USE MOBILE MONEY: - Lost the phone number having this service
MM.38.206	WHY DOES THE BUSINESS NOT USE MOBILE MONEY: - Low capital
MM.38.207	WHY DOES THE BUSINESS NOT USE MOBILE MONEY: - Low circulation of money
MM.38.208	WHY DOES THE BUSINESS NOT USE MOBILE MONEY: - Lack of awareness about this service
MM.38.209	WHY DOES THE BUSINESS NOT USE MOBILE MONEY: - Many problems in business
MM.38.210	WHY DOES THE BUSINESS NOT USE MOBILE MONEY: - Network problems
MM.39	Is the business planning to use mobile money in future
BC.1	How do you rate the current performance of your business (2011)?
BC.2	How do you expect your business to perform in 2012?
BC.3	Do you plan to employ more or less in 2012?
BC.4	Do you plan to invest more or less in 2012?
BC.5	What do you consider your major business obstacles:
BC.5_01	What do you consider your major business obstacles:Competition

BC.5_02	Lack of customers
BC.5_03	Finance/funds
BC.5_04	Bad debts/Customers owing money
BC.5_05	Crime /theft
BC.5_06	Weather conditions
BC.5_07	Stock expire/Breakages/Products perish
BC.5_08	No electricity / water / sanitation
BC.5_09	Power cuts / Power outages
BC.5_10	High rent / Rising rental cost
BC.5_11	Lack of stock / Late deliveries
BC.5_12	Location / No permanent premises
BC.5_13	Lack of skills / Lack of knowledge / Lack of skilled labour
BC.5_14	Suppliers unreliable/late deliveries
BC.5_15	Rising costs/higher operating costs
BC.5_16	Supplies too far away
BC.5_17	Alcohol restrictions
BC.5_18	New business
BC.5_19	Not licenced/getting a licence/registration number
BC.5_20	Location of business
BC.5_21	Can't afford the right equipment-fridge too small/battery needs charging too often
BC.5_22	Ignorance of how to manage money
BC.5_23	Un happy customers
BC.5_24	Small business
BC.5_25	Lack of skills
BC.5_26	Loadshedding
BC.5_27	BC.5 WHAT DO YOU CONSIDER YOUR MAJOR BUSINESS OBSTACLES: - Understaffed
BC.5_28	BC.5 WHAT DO YOU CONSIDER YOUR MAJOR BUSINESS OBSTACLES: - 28
BC.5_29	BC.5 WHAT DO YOU CONSIDER YOUR MAJOR BUSINESS OBSTACLES: - Tribalism
BC.5_30	BC.5 WHAT DO YOU CONSIDER YOUR MAJOR BUSINESS OBSTACLES: - 30
BC.5_48	BC.5 WHAT DO YOU CONSIDER YOUR MAJOR BUSINESS OBSTACLES: - Others
BC.5_49	Others
BC.5_50	Don't know
BC.5_51	None
BC.6	What do you consider your major obstacle for using ICTs for Business:
BC.6_01	What do you consider your major business obstacle for using ICTs for business:No need/Not needed
BC.6_02	Too expensive / Lack of funds
BC.6_03	Lack of skills / knowledge
BC.6_04	Location / No permanent premises
BC.6_05	No electricity
BC.6_06	Power failures / Power cuts
BC.6_07	Network problems
BC.6_08	Business too small
BC.6_09	Security / Safety
BC.6_10	Outdated ICT products / Old computers
BC.6_11	Don't know what ICT'S are
BC.6_12	Internet is slow
BC.6_13	Viruses
BC.6_14	Customers don't use it
BC.6_15	In process of installing
BC.6_16	Crime
BC.6_17	None
BC.6_18	Other
BC.6_19	Dont know
BC.6_20	None
BC.6_21	What do you consider your majaor business obstacle fro using ICTs for business
BC.6_22	What do you consider your majaor business obstacle fro using ICTs for business

BC.6\_23 What do you consider your major business obstacle for using ICTs for business  
BC.6\_24 What do you consider your major business obstacle for using ICTs for business  
BC.6\_47 Others  
BC.6\_48 Don't know  
BC.6\_49 None

BC.6\_50 BC.6 WHAT DO YOU CONSIDER YOUR MAJOR OBSTACLE FOR USING ICTS FOR BUSINESS? - None  
B.7\_8 B.7 IF YES IN B.6 WHY? - Turnover fluctuates  
B.7\_9 B.7 IF YES IN B.6 WHY? - Not given a reason  
B.7\_10 B.7 IF YES IN B.6 WHY? - Already had a loan  
B.7\_56 B.7 IF YES IN B.6 WHY? - Not answered