Assessment of Adoption of Information and Communication Technology Among Small and Medium-Sized Enterprises in Tharaka Nithi County, Kenya

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Abstract

The advent of 20th century has seen many organisations embrace the use of technology to enhance performance. Research has indicated that ICT is a driver for any firm to achieve its goals. ICT has been on the forefront in enhancing globalisation of services and organisation's functions. Various inventions have been made in the ICT field and this has helped organisations to fasten their service delivery. Although the uptake of ICT among SMES in developed countries has been cited to be around forty eight percent, the ICT adoption rate among SMES in developing country is still low averaging at around fifteen percent. The purpose of this study is to investigate the factors that affect ICT adoption among SMEs in Tharaka Nithi County, Kenya. Specifically, the study sought to investigate the impact of ICT information security, ICT infrastructure, management support and employee ICT skills on the adoption of ICT among SMEs. The research utilised descriptive design and was limited to a population of 1700 SMEs in Tharaka Nithi County. The study adopted a stratified random sampling where the population was grouped into stratus according to sectors that SMEs belong to. The study utilised a formula that was proposed by Mugenda and Mugenda where ten percent of SMEs was taken from each stratum and their manager used as a respondent to constitute a study sample size of 170 respondents. In this regard, the respondents were the managers of these SMEs. The study utilised primary data that was gathered using semi-structured questionnaire that contained open as well as closed-ended questions. Content validity of the data collection instrument was assessed by the researcher and the supervisor reviewing the items and adopting it from a similar study. On the other hand, the reliability was assessed by use of Chronbach's alpha coefficient test. The investigator administered questionnaires to the respondents and in cases where the respondent was not available, drop and pick later method was adopted. The study used inferential and descriptive statistics in the analysis of the data, which included mean, standard deviation and distribution tables. The presentation of the results was done in various forms, including charts, graphs, and tables. The findings of the study indicated that the independent variables (ICT information security, ICT infrastructure, and management support and employee ICT skills) were significant and that there was an association between them and ICT adoption (the dependent variable). The value of adjusted R squared in the final model (0.801) shows that the 80.1 percent of variation of the adoption of ICT can be explained by the combination of the four variables. The research established that there was a significant effect of ICT security, ICT infrastructure, management support and employee ICT skills on ICT adoption by SMEs. Both empirical and statistical evidence proved that a relationship existed between these variables and ICT adoption by SMEs. The study recommends that county governments and management should support ICT adoption by SMEs, as well as the central government implement policies and laws that enhance ICT security.

1. INTRODUCTION

The adoption of information and communication technology (ICT) by small and medium-sized enterprises (SMEs) is important as it is considered as a way of enabling the business to compete globally, improve efficiency, as well as, develop closer relationships between the business and its customers (Anoop, Ajjan, & Ashok, 2015).According to Ghobakhloo, Arias-Aranda, and Benitez-Amado (2011), the current business world is being overly affected by ICT, and therefore, its adoption by SMEs would increase their competitive advantage. Thus, it is agreeable that SMEs need to consider adopting ICT so as to take advantage of competitiveness in the globalized market.

Currently, ICT adoption is rapidly changing the business models of enterprises, production processes, and consumption patterns. Thus, adoption of ICT has a critical role in helping to generate business opportunities as well as to deal with competition pressures. A few decades ago, information and communication technology (ICT) was limited to information technology industry, system engineers, and information technology managers. This has changed significantly as of late ICT has become a vital part of mainstream business. ICT is currently utilised in almost all business and government functions and the number of organisations that are adopting ICT are on the increase. Therefore, ICT is no longer a subsection of an organisation, but it is among the main

components that support the functioning of an SME. Adoption of ICT has been found to introduce numerous benefits for an SME. The increasing level of demand for ICT products in Kenya demonstrates the levels of infiltration of ICT in Kenya. The benefits associated with the adoption of information technology include reduced costs, increased efficiency, reduced errors, and time saving (Alam, Ali & Jani, 2011).

A research done by Pelgrum (2010) on sample of schools from twenty six countries showed that ICT adoption obstacles are many and prevalent thus making ICT adoption difficult. Pelgrum indicated that poor ICT infrastructure, lack of expertise and skills in employees, fears of information security, lack of management support among others are specific impediments to ICT adoption by many SMEs. Additionally, Anoop, Ajjan and Ashok (2015) in their study conducted at Kerala-India, posit that inadequate skills, lack of management support, and lack of interest among others have hindered the adoption of ICT among SMEs. Further, Kwacha (2007) in his study conducted in Nigeria argues that some of the common constraints that have blocked the full adoption of ICT by SMEs are lack of proper skilled personnel, high cost of implementation and maintenance, poor attitude of management, poor and sometimes lack of power supply especially in rural areas. With the world moving towards improved integration due to advancements in ICT technology, SMEs will derive particular opportunities from ICT adoption and their capability to be involved in international and regional markets. Therefore, it is startling that evidence from previous literature show a slow response to ICT adoption. The expectations that SMEs would adopt ICT and progress like big firms have not been achieved yet (Oyelaran-Oyeyinka & Adey, 2010).

In spite of the importance placed on the SMEs' ICT adoption and utilization in their daily activities, a research done by Ardjouman (2014) indicated that a majority of SMEs in developing countries have not adopted ICT in their activities. Although many countries in Africa have an adoption rate of ICT at 48% among SMEs, the Kenyan rate of ICT adoption and utilization remains low with only an average of 15% adopting ICT (Nduati, Ombui, & Kagiri, 2015). They argue that though there are numerous benefits of ICT adoption by SMEs, there has been little or no ICT adoption by SMEs in developing countries especially Kenya. The ICT adoption rate by SMEs in Kenya is therefore, comparatively low at 15%.

Despite the importance placed on ICT, a report by the ICT department of Tharaka Nithi County Government showed that out of over 1700 SMEs in the county, less than 14% have adopted ICT (ICT Department, 2016). This scenario shows that the adoption level of ICT by SMEs in the county is still low, and therefore, there must be a reason why the adoption rate has remained low. Based on this background, this study sought to investigate the factors that influence ICT adoption by SMEs in Tharaka-Nithi County, Kenya.

1.1. Small and Medium-Sized Enterprises in Tharaka Nithi County
SMEs have received credit for their contribution in the development and growth of numerous economies in the world (Thulani et al., 2010). Studies have shown that the role of SMEs in economic growth of countries especially in developing countries of Africa cannot be underestimated. According to Thulani et al (2010), SMEs represent over 50% of all employment opportunities and business enterprises in developed countries. A large number of studies in Africa on SMEs have also shown that they have created a large number of employment opportunities.

There are more than a thousand SMEs in Tharaka Nithi County. These SMEs are spread across the county both in major towns and market places (Waweru & Wangechi, 2015). Some of the major towns that host SMEs include Chogoria, Chuka, Kathwana and Marimanti. Other market places that SMEs are situated include Gatunga, Mukothima, and Nkondi. The SMEs in this county operate in various sectors including health, hotel, entertainment and computer and electronics. However, majority of the SMEs are in the traditional sectors of Hotel and Food sector (31%), computer and technology (16%), real estate (15%) and entertainment (9%). The SMEs in the county face almost similar challenges to other SMEs in other parts of the world. In order to prepare for the global market and avert competition, SMEs in Tharaka Nithi County continually engage in activities that improve their efficiency and performance (Wangechi & Waweru, 2015). Although a few SMEs in this county have adopted ICT, majority of them have not yet adopted ICT. Owing to the numerous benefits related to the adoption and utilization of ICT, challenges such as poor ICT infrastructure in the county may have affected adoption and utilisation of ICT by SMEs.

2. LITERATURE REVIEW
2.1. ICT Adoption
According to various studies including the one done by Chairoel, Widyarto, and Pujani (2015), adoption of ICT has been found to introduce numerous benefits for an organisation. The increasing level of demand for information and communication technological products in Kenya demonstrates the levels of infiltration of ICT in Kenya. The benefits associated with the adoption of information technology include reduced costs, increased efficiency, reduced errors, and access to new operational technology (Alam, Ali & Jani, 2011). Recent research has established some of the factors that affect ICT adoption by SMEs, which include ICT security, ICT infrastructure, management support and employee ICT skills (Alam *et al*., 2011). A research done by Ardjouman

(2014) indicated that most SMEs in developing countries have not adopted ICT. Further, Nduati *et al* (2015), in their research showed that the adoption rate of ICT in Kenyan SMEs remained low at only 15%.

2.2. ICT Security and ICT Adoption

There has been argument and rightly so, that the use of ICT has adverse effects when it comes to information security (Featherman, Miyazak, & Sprott, 2010). Additionally, it has been argued that most corporate management are fearful of these security threats (Featherman et al., 2010). It is noted that ICT ranges from technologies that can be implemented as standalone systems to those that are shared over a network. The issue of viruses, worms, eavesdropping and information theft is what has been seen as holding most SMEs back. A study conducted by Oyelaran-Oyeyinka and Adeya (2010) indicated that most financial banks in Kenya had lost money to fraudsters worth 100 billion. This leaves a question of how then will the SMEs be secure with the ICT technology implemented. The authors also indicated that the destruction of sensitive information or disclosure of sensitive information is also a serious threat that has impeded adoption of ICT in many SMEs in Kenya (Oyelaran-Oyeyinka & Adeya, 2010).

According to Sarkar (2010), deliberate actions by people whether insiders or outsiders, pose a serious security threat to the information of an enterprise. Sarkar notes that although some of these actions may be accidental, the damage can be detrimental. Sarkar gives a case where an employee accidentally deletes an important data or an outsider gains access to the enterprise sensitive information through malicious actions. He argues that these actions could see the downfall of the organisation. More so, other problems could be purely malfunctioning of the systems, which could cause real havoc in the enterprise running of daily activities. Some of these can be hardware failure, system crashing, software proms like bugs (Kannabiran & Dharmalingam, 2012).

2.3. ICT Infrastructure and ICT Adoption

Beckinsale, Ram, and Theodorakopoulos (2010) described ICT infrastructure as the facilitating foundation of information technology capabilities that are shared and depended on by businesses. They perceived ICT infrastructure as the part of the ICT architecture that is shared. Madsen (2010) describe ICT infrastructure as the technological foundation of basic, data, communications, and computer systems. Madsen (2010) perceives ICT infrastructure as the technology structure guiding the organisation to satisfy its management and business needs.Duffy (2010) describes the ICT infrastructure as the set of IT resources, which ensure the feasibility of innovations and the ongoing enhancements of IT systems.

Resource constraints are recognized as barriers to ICT adoption. The technological, financial, and human resources are critical to new technology adoption. The large organisations commonly have the resources and infrastructure for facilitating new technology implementation. Conversely, the smaller enterprises are incapable to implement the ICT since due to the lack of resources (Alamro & Tarawneh, 2011). With regard to small enterprises, the leadership might view implementing ICT as being vital but they might lack adequate resources to adopt the technologies. Because cultural, structural, human, and technological factors are critical to facilitating ICT adoption, the insufficiency of such resources causes difficulties for governments to adopt the new technologies. Unlike the larger organisations, SMEs have encountered challenges in trying to obtain finances to lay down the infrastructure required (Kim, Xu & Gupta, 2012). Masoud (2012) identifies cost increment related to adoption as one of the obstacles to ICT adoption. Additionally, Mokaya (2012) showed that the costs of ICT adoption are commonly regarded as being very high by SMEs. Specific costs related to ICT adoption includes; acquiring technological equipment, and the costs associated with the development of information platforms.

2.4. Management Support and ICT Adoption

Effective leadership positively influences ICT implementation in institutions and systems. As crucial leaders of organisational transformation, organisational leaders can enable and support ICT implementation in their organisations. To attain this, organisational leaders have to acknowledge that, the notion of ICT implementation is about ICT utilization and also the transformation of organisational operations and management (Erumban& De Jong, 2010).

The management's level of ICT knowledge coupled with positive attitude to ICT increases the level of ICT adoption as suggested by Harrigan et al (2010). Consequently, this is not the case as the owners of SMEs who most of the times double as the senior managers have little knowledge of ICT which is a serious barrier to its adoption. According to Zaied (2011), management of SMEs shy away from investing in various ICT technologies as well as training their staff on matters of ICT.

2.5. Employee ICT Skills and ICT Adoption

The literature recognises the lack of knowledge and awareness on the adoption of technology as one of the important obstacles to its adoption. SMEs such as those in Kenya lack technology-qualified personnel for

spearheading ICT adoption (Bagchi & Udo, 2010). Employees' knowledge concerning ICT is positively associated with the SME's ICT adoption (Apulu & Ige, 2011).Research has shown that if employees perceive ICT as either fulfilling their own requirements or those of their customers, their likelihood of accepting it in their organization is high(Apulu, Latham, & Moreton, 2011). On a similar note, Ongori and Migiro (2011) also cited employees' lack of proficient ICT skills as being one of the relevant hindrances in the acceptance of ICT in SMEs globally.

Research suggests employee's skills, adequacy, beliefs, and attitudes affect successful adoption of ICT in enterprises. This is attributed to the necessity of changes in the employees' qualifications and workplace attitudes during the adoption of new technologies. It also requires changes in employees' degree of knowledge on the ICT technology itself and performance levels. In a study conducted at ICT Centre in Iran, the findings established that the slow or lack of adoption of ICT is associated with the lack of cognizance concerning the opportunities or advantages provided by ICT adoption (Khalil Moghaddam & Khatoon-Abadi, 2013). The authors also point out to poor ICT skills in employees that hinder adoption of ICT as they fear being phased out. Further, Khalil et al (2013) clearly state that employees' knowledge and their readiness to utilize ICT technologies influence its adoption.

The literature also recognizes the deficiency of technology-qualified personnel as one of the barriers to ICT adoption. The rapid pace associated with technology development is an implication that enterprises need new personnel, and this is a relevant obstacle to ICT adoption(Costello, Jackson, & Moreton, 2013). They argue that one of the key reasons for the failure of small organisations to adopt ICT is the lack of internal expertise. Most SMEs have been stuck in their initiatives to implement the ICT or other new technologies,pending the acquisition of adequate internal expertise. Thus, when an organization's employees possess certain knowledge on ICT, the SME is better positioned to implement ICT. In their study, Costello et al (2013) attribute the unhurried pace of ICT adoption to the deficiency of technical resources and expertise for ICT implementation. Further, they posit that the deficiency of technical ICT knowledge and skills among the employees has considerably influenced ICT adoption. According to (Chairoel, Widyarto, & Pujani, 2015), the difficulties faced by many enterprises in getting the qualified persons with the requisite skills and knowledge as well as the possibility of dissipation of the particular knowledge of the organisation is a considerable challenge to ICT adoption.

3. RESEARCH METHODOLOGY

According to Kothari (2008), research design is the plan enabling the researcher to arrive at solutions to problems and also guides the researcher through the several phases of the study. This research adopted descriptive research design. According to Robson (2002), descriptive design looks to explore and explain as well as add more information on a topic by portraying a precise profile of situations, events, and persons. Therefore, the descriptive design was suitable for this research because it helped to respond to the questions of the present condition/status and described the nature of the current conditions of the phenomenon under study. More so, the descriptive design helped in describing the characteristics, attitude and behaviour of the subject under study. Besides, the descriptive design explored and explained as well as added more information on a topic.

The scales used in this research were adapted from previous literature. The scale was utilized for measuring the study's items with the exception of demographic or firm characteristics. The utilization of this scale was associated with its suitability in responding to the research questions. Specifically, the Likert scale was the most appropriate interval scale in this study. The Likert scale had 5 points such that strongly disagree=1, disagree=2, 3= neutral, agree=4, and strongly agree=5. This scale allowed the respondents to answer the items in the survey with greater specificity. The qualitative data which was produced from open-ended questions was categorised into themes in line with study objectives and described in narrative form. The quantitative data was analysed using inferential and descriptive statistics. The researcher performed the analysis of the data assisted by the statistical Package for Social Sciences (SPSS) version 21 by conducting various statistical tests. The findings of the analysis were presented utilizing graphs, pie charts, and tables. The descriptive statistics included measures of relative frequencies, standard deviation (measure of variability), the mean (measure of central tendency) and frequency distribution tables

The inferential statistics comprised of a linear regression model. This model was utilised to determine the effect of the independent variables on the dependent variable. The form that will be taken by the multiple linear regression equation is as below.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$$

From the equation, Y = Adoption of ICT by SMEs, X_1= ICT information security, X_2= ICT infrastructure, X_3= Management support, X_4= employee ICT skills, while β_1, β_2, β_3 and β_4 are the regression coefficient and ε is the error term.

4.   RESEARCH FINDINGS AND DISCUSSIONS

Descriptive statistics

ICT Security and ICT Adoption

The respondents rated a number of issues concerning the security of the ICT. The responses were recorded in the table 4.7. The respondents were asked whether they were aware of the security threat to the ICT. The mean was 3.8357 while the standard deviation was 0.64161. The results show that majority of the respondents agree that they are aware of the security threats to the ICT. Asked if all the computers are installed with softwares, most of the respondents agreed with a mean of 3.9571 with a standard deviation of 0.44675. This indicates that majority of the respondents agree that all computers in their organisations are installed with antivirus programs. Asked whether their computers have suffered threats before, the mean is 4.0214 while the standard deviation is 0.61712, meaning majority of the respondents strongly agrees that computers in their firms have suffered security attacks. The standard deviation confirms this even more as the responses are spread near the mean. On whether the staff understands the importance of data security, the mean was 4.2714 while the standard deviation was 0.98801, showing that most of the respondents strongly agree with the assertion. The results indicate that staff members are aware and understand the importance of data security.

Table 4.7: ICT Security

Statements	N	Minimum	Maximum	Sum	Mean	Std. Deviation	Variance
I am aware of ICT security threats	140	1.00	5.00	537.00	3.8357	.64161	.412
All the computers are installed with antivirus soft wares	140	1.00	5.00	554.00	3.9571	.44675	.200
Our computers have suffered one or all of the security threats: virus, hacking or insider jobs compromises	140	1.00	5.00	563.00	4.0214	.61712	.381
Our staff understand the importance of information security	140	1.00	5.00	598.00	4.2714	.98801	.976
We are afraid of digitalizing our functions due to fear of information security	140	1.00	5.00	571.00	4.0786	.86555	.749
Valid N (list wise)	140						

Source: Survey Data, (2016)

The respondents were asked whether they were afraid of ICT adoption due to security threats. Most of the respondents strongly agreed that they feared security threats with a mean of 4.0786 while the standard deviation is 0.8655.

These findings agree with those of Featherman et al. (2010) who argued that information security is one of the reasons why most organisations are reluctant to embrace digitalisation. These according to the authors could see the downfall of the organisation. More so, other problems could be purely malfunctioning of the systems, which could cause real havoc in the enterprise running of daily activities. Some of these can be hardware failure, system crashing, and software proms like bugs.

Table 4.8: ICT security as a serious threat

Question	N	Minimum	Maximum	Mean	Std. Deviation
Do you think ICT security is a serious Threat to the adoption of ICT by SMEs?	140	1.00	2.00	1.0857	.28095
Valid N (list wise)	140				

Source: Survey Data, (2016)

Asked whether they thought that ICT security is a threat to the adoption of ICT, most of the respondents agreed that it was a threat, asked why they thought so; most of the respondents say that they were afraid of getting their organisational information compromised. Sarkar (2010) asserts that a deliberate action by people whether insiders or outsiders poses a serious security threat to the information of an enterprise. He notes that although some of these actions may be accidental, the damage can be detrimental.

4.4.2. ICT Infrastructure and ICT Adoption

The study wanted to determine the opinion of the respondents on the infrastructure needed for ICT adoption in SMEs. The respondents had to select their responses as either strongly disagree, disagree, neutral, agree, or strongly agree.

Table 4.9: ICT Infrastructure

Statements	N	Minimum	Maximum	Mean	Std. Deviation
My organisation has adequate computer systems	140	1.00	6.00	3.8643	1.04027
The network and internet infrastructure is good in my organisation	140	1.00	5.00	3.7929	1.42686
Existing infrastructure supports ICT integration to business processes	140	1.00	5.00	3.1857	1.30072
The Software and other computer applications are readily available	140	1.00	5.00	3.8714	1.30766
Valid N (list wise)	140				

Source: Survey Data, (2016)

The respondents were asked whether their organisations have adequate computer systems, most agreed with a mean of 3.8643 with a standard deviation of 1.04027. This indicates that majority of the respondents agreed that their organisations have adequate computer systems. However, with the standard deviation being 1.04027, it shows that the responses were spread out away from the mean, an indication that some respondents may not have agreed with this assertion. Asked on whether the internet infrastructure was good, the mean was 3.7929 with a standard deviation of 1.426 to signify that most of the respondents were in agreement. The results, especially the standard deviation shows that the responses were spread out away from the mean. Therefore, this shows that there are many respondents who did not agree with this assertion and therefore, many of SMEs could be lacking internet infrastructure. Asked on the existing infrastructure and whether they support ICT integration to the business processes, most of the respondents agreed at a mean of 3.1857 and the standard deviation was 1.30072, an indication that the responses were spread away from the mean and therefore, many respondents could have disagreed with the assertion. Asked on whether the software and other computer applications are readily available the mean was 3.8714 and the standard deviation was 1.30766. This shows that although majority agreed there was software and applications are available, the responses were spread out away from the mean and this means that many respondents could have disagreed with the assertions. The findings agree with the work of Duncan (2010) who has indicated that many enterprises even in developed countries have had problems adopting ICT because of the cost of hardware, software infrastructure. The respondents were asked what they thought about ICT adoption in Tharaka Nithi County; most said that the adoption rate is still low amongst most business organisations.

4.4.3. Management Support and ICT Adoption

The study focused on obtaining the responses on management support as far as ICT adoption is concerned. The findings are illustrated in table 4.10.Most of the respondents agree that their organisations have enough ICT resources for learning, training, and capacity building with a mean of 2.6643 with a standard deviation of 1.1276. This means that majority of the respondents were neutral or not sure whether their organisations have enough ICT resources for training and learning. However, the standard deviation shows the responses were spread away from the mean, an indication that many respondents could have agreed or disagreed with the assertion.

Table 4.10: Management Support

Statements	N	Minimum	Maximum	Mean	Std. Deviation
My organisation has enough ICT resources for learning, training and capacity building	140	1.00	5.00	2.6643	1.12276
My organisation has budgeted for upgrading ICT resources	140	1.00	5.00	3.3786	1.49082
My organisation holds workshops and training seminars on ICT for our staff	140	1.00	5.00	3.0714	1.47713
There is a formal plan of monitoring and evaluating ICT resources by the management	140	1.00	5.00	3.5071	1.14110
The management attitude is positive about ICT integration in your organisation	140	1.00	5.00	2.8714	1.54008
Valid N (list wise)	140				

Source: Survey Data, (2016)

On the budget for upgrading the ICT resources, the mean was 3.3786 and a standard deviation of 1.47713. This indicates that majority agree with the assertion; however, the responses are spread away from the mean as shown by standard deviation. This could mean that some respondents disagreed with this assertion.

The respondents also agreed that the organisation holds seminars with a mean of3.014 with a standard deviation of 1.4110, which indicates that responses were spread way from the mean. This means that some respondents disagreed with this assertion and thus there are no seminars and trainings held for staff.

Further, the respondents agreed that there is a framework for adopting the ICT with a mean of 3.5071 with a

standard deviation of 1.14110. The results show that although majority agreed, the responses were spread away from the mean and therefore, show that some respondents disagreed with the assertion.

The management attitude was thought not to be positive with a mean of 2.8714 and a standard deviation of 1.54008 signifying that most of the respondents do not agree with the assertion. The findings agree with the research done by Zaied (2011) that indicated that management of SMEs shy away from investing in various ICT technologies as well as training their staff on matters of ICT. He argues that most of the managers fear the takeover of their positions by subordinate staff.

4.4.4. Employee ICT Skills and ICT Adoption

The study wanted to determine whether the employees of the SMEs had ICT skills because they are necessary for ICT adoption in SMEs. The respondents had to select their responses as either strongly disagree, disagree, neutral, agree, or strongly agree. The results are shown in table 4.11.

Asked whether the staff have received enough training on the use of ICT the mean was 2. 8714, and standard deviation of 1.54008, which indicates majority disagreed. However, the standard deviation shows that the responses were spread out away from the mean, which means some respondents agreed or were neutral. On whether the staffs have the right skills to use ICT, the mean is 2.6357 and a standard deviation of 1.11375, which shows majority, disagreed with this assertion. Further, the respondents were asked whether their staff were competent enough to use ICT and the responses had a mean of 3.0286 and standard deviation of 1.38825. This means that majority of the respondents were neutral and that responses are spread away from the mean. Thus, some respondents had agreed or disagreed with the assertion.

Table 4.11: Employee ICT Skills

Statements	N	Minimum	Maximum	Mean	Std. Deviation
Our staff have received enough training on the use of ICT	140	1.00	5.00	2.8714	1.54008
Our staff have the right skills to use ICT technologies in firm	140	1.00	5.00	2.6357	1.11375
Our staff are competent enough to use ICT in the organisation	140	1.00	5.00	3.0286	1.38825
Our staff receive regular refresher courses on ICT skills	140	1.00	5.00	3.2143	1.23955
Our staff understand various ICT technologies and apply them in our organisation	140	1.00	5.00	3.0357	1.20795
Valid N (list wise)	140				

Source: Survey Data, (2016)

Asked whether the staff receive regular refresher courses on ICT skills, an average mean of 3.2143 was obtained, which shows neutrality in their responses with a standard deviation of 1.23955. This standard deviation indicates that some respondents either agreed or disagreed and that is why the responses were spread away from the mean. On whether the staff understands various ICT technologies and applies them in the organisation; the mean was 3.0357 with a standard deviation of 1.20795, which suggests that most of respondents were neutral in their responses. The standard deviation implies that the responses were spread out away from the mean and therefore, some respondents either agreed or disagreed with the assertion.

These findings were in agreement with a study done by Khalil et al (2013) who argues that employee ICT skills influence the adoption of ICT by SMEs. The authors argue that adoption of ICT require changes in the level of performance of employees and adequate skills in ICT skills. They further suggest that poor ICT skills by employees hinder the successful adoption of ICT by SMEs.

4.3.5. Adoption of ICT

This study wanted to determine the opinion of the respondents on the adoption level of ICT in small and medium size enterprises. The respondents had to select their responses as either strongly disagree, disagree, neutral, agree, or strongly agree.

Table 4.12: Adoption of ICT

Statements	N	Minimum	Maximum	Mean	Std. Deviation
I think we have adopted ICT in our organisation	140	1.00	5.00	3.2571	1.23131
We have good internet access in our organisation	140	1.00	5.00	3.1643	1.43748
We have enough computers in our firm	140	1.00	5.00	3.0214	1.34361
I think there is a problem in the uptake of ICT by SMEs in general	140	1.00	5.00	4.2643	.09025
Valid N (list wise)	140				

Source: Survey Data, (2016)

The respondents were asked whether they had adopted ICT in the organisation. The responses had a mean

of 3.2571 with a standard deviation of 1.23131.This indicates a neutral response, which means they could not tell whether they had adopted ICT or not. On the internet access, the mean is 3.1643 and standard deviation of 1.43748. These results show that the respondents remained neutral on the internet issue, although the standard deviation indicates that responses were spread out away from the mean, indicating that some respondents agreed and others disagreed. On whether there are enough computers in the organisation, the mean was 3.0214 and a standard deviation of 1.34361, which shows neutrality in their responses. However, the standard deviation indicates a deviation from the mean, which means some respondents agreed and others disagreed with the assertion. Most of the respondents, however, think that there is a problem in the adoption of ICT with a mean of 4.2643 and standard deviation of 0.09025. This signifies that most of the respondents agree that there is a level of ICT adoption in their organisations although the level of adoption still remains low. As such, the responses indicated that although there was a bit of adoption of ICT by SMEs, the adoption level was still low and not to the expected levels.

These findings are in agreement with a research done by Ardjouman (2014) that indicated that most SMEs in developing countries have not adopted ICT. Further, the findings agree with a study done by Nduati *et al* (2015), which showed the adoption rate of ICT in Kenyan SMEs remained low at only 15%. Further, the findings agree with a report done by the Department of ICT of Tharaka Nithi County Government which showed that less than 14% of SMEs in the county have adopted ICT.

4.5. Regression analysis

The regression analysis method was used to come up with an explanation of the factors that influence ICT adoption by *SMEs*; the analysis was done with the use of SPSS analysis tool. The model equation is as shown below.

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \varepsilon$$

Where

Y = Adoption of ICT by SMEs

X_1 = ICT Security

X_2 = Infrastructure on ICT

X_3 = Management Support

X_4 = Employee ICT Skills

ε = Error term

Table 4.13: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.918[a]	.843	.801	6.19999

Source: Survey data (2016)

a.   Predictors: (Constant), Employee ICT Skills,

Management Support, ICT Infrastructure, ICT Security

The value of the adjusted R squared in the final model (.801) shows that the 80.1 percent of variation of the adoption of ICT can be explained by the combination of the four variables; ICT Security, ICT infrastructure, management support and Employee ICT skills. The remaining 19.9 percent account for the unexplained variance, which means 19.9 percent of variability has not been accounted for.

Table 4.14: ANOVA Table

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	3087.401	4	771.850	20.079	.000[b]
	Residual	576.599	15	38.440		
	Total	3664.000	19			

Source: Survey Data, (2016)

a. Dependent Variable: Adoption of ICT

b. Predictors: (Constant), Employee ICT Skills, Management Support, ICT Infrastructure, ICT Security

The ANOVA analysis for individual factors affecting adoption of ICT by SMEs is presented in Table 4.14. The p-value of 0.000, which is less than 0.05 indicates that the overall model is significant. This means that at least one of the independent variables was a significant predictor of the dependent variable.

Table 4.15: Regression Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	49.322	9.908		4.978	.000
	ICT Security	.939	.163	.670	5.773	.000
	ICT Infrastructure	-.114	.064	-.198	-1.794	.000
	Management Support	1.021	.255	.435	-3.997	.001
	Employee ICT Skills	.043	.135	.037	.319	.000

Source: Survey data (2016)

a. Dependent Variable: Adoption of ICT

The coefficients for the four individual factors affecting adoption of ICT by SMEs are presented in Table 4.15. ICT Security (p=0.000), ICT Infrastructure (p=0.000), Management Support (p=0.001) and Employee ICT Skills (p=0.000) showed that all the four predictor variables were significant factors that affected the adoption of ICT by SMEs.

From the results, a unit increase in ICT security would result in a.939increase in ICT adoption by small and medium-sized enterprises. ICT security is a significant determinant of ICT adoption as shown by the p-value of 0.000 that is <0.01. Therefore, ICT security affects ICT adoption by SMEs. These findings agree with a study by Feathermanet al (2010) who argued that information security is one of the reasons why most organisations are reluctant to embrace digitalisation. These according to the authors could see the downfall of the organisation. More so, other problems could be purely malfunctioning of the systems.

The results also show that a unit increase in ICT infrastructure would result in a 0.114unit decrease in the adoption rate of ICT by SMEs in Tharaka Nithi County. ICT infrastructure is a significant determinant of ICT adoption as indicated by the by the p-value of 0.000. Therefore, this shows there is a negative significant relationship between ICT infrastructure and adoption of ICT by SMEs. This disagrees with a study by Duncan (2010), who suggested that many enterprises even in developed countries have had problems adopting ICT due to the cost of hardware and software infrastructure.

More so, the results show that a unit increase in the Management support would result in a 1.02 increase in ICT adoption by SMEs in Tharaka Nithi County. In this regard, management support is a significant predictor of adoption of ICT as shown by the p-value of 0.001 which is <0.01. The p-value being less than 0.01shows there exist a positive significant association, and thus management support affects adoption of ICT by SMEs. This agrees with Harrigan et al (2010) who posits that the management's level of ICT knowledge coupled with positive attitude towards ICT increases the level of ICT adoption. Harrigan also indicates that lack of support from management leads to low rate of ICT adoption by SMEs.

On the employee ICT skills, a unit increase in the value of ICT skills would result in a .043 increase in the level of adoption of ICT by an SME, and vice versa. According to the results, ICT employee skills is a significant predictor of adoption of ICT. This is supported by a study done by Ongori and Migiro (2011) who argued that when employees are proficient in ICT matters, the adoption rate increases. Also, a study done by Apulu and Ige, (2011) showed that the knowledge of the employees of an enterprise regarding ICT is positively related to the SME's ICT adoption. On a similar note, Ongori and Migiro (2011) also cited employees' lack of proficient ICT skills as being one of the major hindrances in the acceptance of ICT in SMEs globally.

5. CONCLUSION AND RECOMMENDATIONS
Conclusion
One of the objectives was to determine the influence of ICT security on the adoption of ICT by SMEs. This objective was achieved as a positive significant association existed between ICT security and ICT adoption. Specifically, the analysis established that a unit increase in the ICT security predicted increased in the adoption of ICT by SMEs.

The other objective was to assess how ICT infrastructure affected the ICT adoption by SMEs in Tharaka-Nithi County. The study concludes that ICT infrastructure was a significant predictor of ICT adoption by SMEs. However, the results of this predictor disagreed with previous studies. This means that ICT infrastructure is negatively and significantly related to ICT adoption.

On management support, the study showed that management support was a significant predictor of the adoption of ICT by SMEs. The results indicated that a unit increase in management support predicted an increased ICT adoption by SMEs. These results were in agreement with most of the studies regarding this

variable.

On the employee ICT skills, the study revealed that it was a significant predictor of ICT adoption by SMEs in Tharaka-Nithi County. The results showed that an increase in employee ICT skills would lead to an increased adoption of ICT.

This study established the significant effects of ICT security, ICT infrastructure, management support and employee ICT skills on ICT adoption by SMEs. Both empirical and statistical evidence have proven these variables are significant predictors of ICT adoption by SMEs. Therefore, the study has demonstrated that for effective ICT adoption by SMEs, ICT security must be enhanced, improved ICT infrastructure, support from management, and employees should possess ICT skills.

Recommendations

The study recommends that the county governments to support the adoption of ICT by SMEs through enhancing and providing ICT infrastructure like internet access as a strategy of enticing SMEs to implement ICT.

The central government needs to implement policies and laws that are geared towards enhancing ICT security so as to eradicate the fear for information security, as the study has shown that improved ICT security would lead to increased adoption of ICT.

There is also need for employees of these SMEs to be trained on ICT usage and enrolled for refresher courses regularly to enhance their ICT skills, as the findings of the study have shown that increased employee ICT skills would lead to increased adoption of ICT by SMEs.

Suggestion for Further Research

Further research should be done geared towards establishing the relationship between ICT adoption and performance of SMEs. This was not covered in this study and therefore, it would be important to investigate whether adoption of ICT has any impact on performance of SMEs.

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