

**AN ASSESSMENT OF USE OF INFORMATION COMMUNICATION
TECHNOLOGIES IN AGRICULTURAL TRAINING CENTERS**

A CASE STUDY OF CENTRAL KENYA

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DECLARATION

This project report is my original work and has not been presented to any other institution of learning for award of a degree.

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DEDICATION

This work is dedicated to my late father Samuel, who as early as in my primary school told me that he believed I was destined to go far.

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ABBREVIATIONS AND ACRONYMS

ATC	Agricultural Training Centre's
CCTV	Closed Circuit Television
CD	Compact Disk
CD ROM	Compact Disc -Read Only Memory
DVD	Digital Versatile Disk
GOK	Government of Kenya
ICT	Information Communication Technologies
IFRI	International Forestry Resources and Institutions
KARI	Kenya Agricultural Research Institute
KARI	Kenya Agricultural Research Institute
LCD	Liquid-Crystal Display
MDG	Millennium Development Goals
MOA	Ministry of Agriculture
MOED	Ministry of Education

ABSTRACT

Agricultural Training Centers (ATCs) have been gaining popularity since the 1960s with more and more farmers engaging in farming especially in the central Kenya region. As a Government initiative, the Ministry of Agriculture has been allocating substantial amounts of resources both human and financial to these institutions to improve their performance. In pursuit of achieving remarkable milestones towards digital evolution in the sector the Ministry identified the ATCs as areas where Information and Communication Technologies could be used to improve farmers and stakeholder's trainings thus making agricultural information and commutation more efficient. A study was carried out in the six ATCs in central Kenya region to assess the effective use of ICTs in these institutions. Data was collected through administration of questionnaires to the staff of the six ATCs. The questions in the questionnaires were centered on demographic characteristics, availability of ICTs, various uses of the available ICTs, skills and competence possessed by the staff and the trainings which are offered that require use of these ICTs. The major findings of the study are that the ATCs in Central Kenya have various available ICTs for use by the staff who are mostly in the age bracket of 35-50years. It was evident that most of staff lacked the knowledge to use the more recent and sophisticated ICTs and where ICTs were used they were used for other purposes other than the core purpose of trainings. It is clear that the staff requires refresher causes in ICT use. From the findings it also emerged that use of internet services was both expensive and unreliable. This therefore means that there is need for upgrading and improving the current internet connections and electricity supply through local networking and power supply, consequently leading to increased bandwidth and access points.

CHAPTER ONE

INTRODUCTION

1.0 Background of the study

Today new paradigm of agricultural development is fast energizing in both developing and developed countries. The overall development of rural areas is expanding in new directions away from the old ways of delivery. Sources to citizens are being challenged and traditional societies are being transformed into knowledge societies all over the world (Meera *et al*, 2004).Agriculture extension in the current over rapidly changing world has been recognized as an essential mechanism for delivering information and advice to farmers on modern farming (Jones, 1997).However it has to transform from the narrow mindset of transferring technology package to transferring knowledge or information packages. With the help of ICTs this can be achieved leading to extension being more diversified, more knowledge and intensive and more demand driven and thus more effective in meeting farmers' information needs (Derntl and Hummel, 2005).According to Kilpatrick (2000), the skills required by farmers in the past in order to succeed in agriculture will in future need to be supplemented with additional skills in order to cope with the changes that have emerged over recent decades. Good technical skills in crop and livestock husbandry will need to be supported with skills in financial and risk management which are better presented using ICTs. This will ensure better survival of the agricultural sector in future.

Countries that have harnessed the potential of Information and Communications Technologies (ICTs) have attained significant social and economic development. In addition, these countries are rapidly transforming into information and knowledge-based economies. The Government of Kenya, therefore, recognizes the role of ICTs in the social and economic development of the nation and has promulgated a national ICT Policy based on the Economic Recovery Strategy for Wealth and Employment Creation 2003-2007. Kenya Vision 2030 Strategy clearly identifies agriculture as one of the six key economic sectors expected to drive the economy to a projected 10 percent rate annually over the next two decades (MOA, 2008). Agriculture is therefore central to the achievement of Vision 2030 whole goal will be realized partly by the promotion of an innovative, commercially-oriented and modern agriculture.

Farmer trainings were initially aimed at introducing farming knowledge to the African farmer to crop and animal production of which most had an exotic origin. Due to the diversity of Kenya's agricultural practices and commodities the ATCs were then required to come up with their own demand driven, tailor made course content to suit the needs of their catchment areas.

The ATC farmer clientele come from different backgrounds in terms of age, education and skills and thus their level of their training needs vary depending on their capability to understand and learn. The ATCs were intended to be the most basic schools for farmers on agricultural practices where learning could be done in the most appropriate method possible including, demonstration plots, visual aids, classwork, observations and field tours. The duration of trainings of these courses range from hours to a week and could be residential or non-residential and farmers will choose which suits them. Reaching farmers through field visits by extension workers is currently limited by the fact that, the workers are few in numbers, population of farmers has risen, the farmer is more informed and land demarcations have increased resulting in smaller farm sizes, calling for intensive farming technologies with new approaches to production and marketing.

1.1 Problem Statement

The last decade has been characterized by emergency of sophisticated farming, value addition and marketing technologies, it is becoming necessary to improve on the training methodologies to farmers in order to satisfy their unique agricultural needs. There have been dynamic changes in farming with the advancements of technologies and the farmer has moved from the traditional farmer to a modern one who is always seeking for information and the most updated for that. (Sharifzadeh, et al, 2009). This scenario has seen the ATCs as training institutions being at the forefront in offering quality trainings to farmers to remain relevant and to keep pace with technology for the broader goal of agricultural development.

A survey carried out by a group of experts in 2006 for the 27 ATCs established low uptake of agricultural technologies by farmers trained at the ATCs which they attributed partly to training methods used .They identified a need to incorporate use of ICTs in trainings and it recommended that each ATC be facilitated with a number of computers, funds to establish a library and to have internet connections. Further recommendations included trainings of officers in the ATCs on emerging technologies and computer skills. A similar research carried out by Wims and Lawler (2007) investigating the impact of ICTs trainings in Kenya. In particular the study was carried out in Keiyo district targeting some primary schools and one agricultural training college .The

researchers established the major issues in their findings to include :the need for staff training, mainstreaming of ICT across the curriculum, additional computer equipment for staff and farmers and the development of relevant software and Internet access .The researchers mentioned among their recommendations staff training, internet access and the provision of equipment and software as areas that needed further attention to improve uptake of agricultural knowledge by both students and farmers.(MOA,2006).

According to the MOA, (2006) report it was recommended that more use of visual aids and ICTs should be encouraged in agricultural trainings as they were likely to simplify information delivery. (Samah, et al 2007) also recommends that information should be presented in appropriate formats in order to be effectively used by the rural communities citing that messages delivered through video and especially in local languages have proved to be very effective.

The Government of Kenya through the Ministry of Agriculture is mainstreaming the adoption of ICT and promoting it as a key step in bridging the digital divide. Considerable investments by the Government in these institutions in terms of, information base, personnel and financing of farmer trainings has been ongoing.

As much as the recommendations were made in order to improve communication and progress on their implementation is on course, the survey did not look at issues relating to staff training skills, levels of ICTs usage, type of trainings offered at these institutions and the overall effectiveness of ICT use which consequently, this study aims to examine in order to establish normal practice and to determine the effects of adopting ICTs at training level.

1.2 Purpose of the study

This research project aims at assessing the use of information and communication technologies in training farmers and other stakeholders at the Agricultural Training Centre's, the status of these recommendations and the effectiveness of their implementation

1.3 Specific Objectives

The specific objectives of the study are to:

1. Identify the types of ICTs services available in the ATCs
2. Determine the level of ICT skills possessed by the ATC personnel
3. Establish the levels of use of the ICTs for trainings
4. Identify the type of trainings offered at the ATCs

1.4 Research Questions

1. Are the available ICTs in the ATCs sufficient in assisting the staff in carrying their trainings?
2. Are the ICTs in the ATCs being adequately utilized for trainings?
3. Do the ATCs staffs possess adequate skills and competences to enable them handle the ICTs during trainings?

1.5 Justification of the study

The Agricultural Training Centres, formerly referred to as Farmers Training Centres (FTCs) initially concentrated on training of farmers only. With time the institutions have grown to a level where they offer training services and facilities to other stakeholders which is in conformity to the vision of being centers of excellence for training of farmers and other stakeholders.

The farmers' training needs have moved from production of crop and animal and soil conservation to broader needs address post-harvest issues including value addition, marketing and emerging farming technologies. In this respect ATCs are viewed as resource centers.

The Ministry of Agriculture has since the year 2004 made deliberate efforts to revitalize the ATCs towards which the Government has been allocating extra funds to the Ministry for modernization of these institutions. This modernization drive includes among other aspects promotion of Information and Communication Technology (ICT) for both administrative and training purposes. In the Ministry of Agriculture Strategic Plan 2008-2012, the ministry intended to improve access to information and use of ICT based tools in realization of the fact that information generation and dissemination was key for the success of the sector. In an effort to enable access to integrated information a ministerial ICT strategy was founded to act as a road map towards the envisioned electronic (e-)Agriculture.

Towards this there were plans to develop essential ICT infrastructure and information delivery mechanisms with the ICT development being an integral part of the strategy implementation. In an effort to develop and sustain a well-trained human resource on ICT the ministry planned to undertake appropriate trainings to equip staff with the relevant and suitable skills to effectively tackle the their work and deliver on the Ministry goals. All the MOAs training institutions throughout the country were to be empowered to facilitate the ICT skills upgrade.

To realize the efficiency and effectiveness of training through ICT, it is important to monitor and evaluate the implementation of the programme and document findings for use as reference material and serve to improve service delivery to stakeholders and the general public.

This research work proposes to address these effectiveness issues and provide insights into better utilization of information superhighway facilities in training. The findings will also provoke further research in the field and assist in better policy formulation on ICT for agricultural training institutions that deal with farmers, extension providers and trainers.

1.6 Scope of the study

The study was carried out in the Central Kenya region covering six ATCs, Wambugu of Nyeri county, Mariira of Murang'a county, Waruhiu of Kiambu county, Ol Jol Orok of Nyandarua county, Kamweti of Kirinyaga county and Njabini of Kiambu county.

1.7 Limitation of the study

The ATCs in the country are sparsely located thus financial implications influence the selection of the sample size. For this study therefore the data analyzed from the sample size selected has been taken to represent the other remaining 21 ATCs although no comparative studies have been carried out in them. Time for research work was also affected by the working conditions and availability of respondents owing to the fact that the research targeted specifically the staff working at these ATCs as the respondents.

1.8 Definition of Terms

Agricultural Training Centres-are institutions of learning where people are trained on Agricultural practices through classroom and demonstration models among others

Agricultural Stakeholder-a person who has interest in the agricultural sector in one way or another for example investors, traders, marketers, agro processors, agro suppliers and others.

Farmer-a person who earns his living through practicing farming of crops and rearing of livestock

ICTs-includes the tools, equipment, channels, services and facilities that aid in communication of information by use of electronic media. Examples include computers, printers, modems, photocopiers, mobile forms and many others.

Trainings-are organized sessions by the staff through which they disseminate agricultural knowledge to farmers

Training staff-are agricultural extension staff deployed in the ATCs to train farmers

1.9 Theoretical Framework

The study has been supported “The mathematical Theory of Communication” of 1948 by Claude Shannon and Warren Weaver and also borrows slightly from the knowledge management systems architecture.

The two engineers Shannon and Weaver theory viewed communication of information as a perfect linear process of transmission of information from sender to receiver and defined information as “the amount of choice of freedom the source has when constructing a message” (Weaver, 1949).The sender selects the information from a set he or she has from the environment, converts it into signals and sends it to the receiver who decodes it and sends it to the destination. In this study, staff at the ATCs are the senders of agricultural information on one side and farmers the receivers on the other side. The staff have a wide range of agricultural information available to them from various sources thus have the freedom to choose from it the content that suit the information needs of the farmers. The staff then converts the information they have using the available ICTs in forms that are suitable for the farmers for easier access and understanding ensuring the information retains its intended meaning. ICTs here act as the signals to aid in transmission of information.

The model was initially developed to separate noise from information-carrying signals and involved breaking down an information system into sub-systems so as to evaluate the efficiency of various communication channels and codes. It is on this strength that this study is anchored to assess the effective use of various information and communication technologies including channels which essentially use electronic media to transmit information. The use ICTs of the right channel capacity (bandwidth) as mentioned in the theory and which is defined as “maximum amount of information a channel of communication can carry” (Shannon, 2001) are viewed as solutions to otherwise ineffective communication. For example a channel for transmitting audio should be smaller than one carrying audio and visual signals

Knowledge management systems cycle is another area the study borrows from and specifically on the knowledge management architecture creation. Knowledge management (KM) has been defined as “ getting the right information to the right people at the right time, and helping people

create knowledge and share and act upon information in ways that will measurably improve the performance”(Kings, 2009) of their organization and its partners. The knowledge management architecture involves three components namely, process, services and systems. The processes are oriented on the way in which people do their day-today work in the organization (the how and why) and in these are reflected in the study by the evaluation of how the trainings or information is passed to the farmers by asking what ICTs are used for trainings in the ATCs and further explain why their use is necessary. Services are focused on who will help people share their knowledge and who will maintain tools and processes (the who). These is the study refer to the staff of the ATCs who are at the forefront of disseminating information to farmers whom in their daily engagements in farming of crops and keeping of livestock are constantly seeking for information for continued sustainability. The staff therefore require to be acquainted with the ICTs which are the processes in order to perform. Lastly are the systems(the what and where), which may include the information technologies infrastructure, standards, policies and other requirements necessary to deliver the processes and services efficiently and effectively to the end users who in this case are the farmers. Holm *et al*, (2002) in his knowledge management system architecture views ICTs as drivers which have been shown to improve efficiency by speeding up information retrieval, reducing knowledge loss and stimulating knowledge growth and creation. This among other models and theories have informed this study as the researcher seeks to assess the available Information and communication technologies in the ATC and evaluate how they are utilized and the skills competencies of the staff who use them to monitor progress and establish the gaps for intervention.

1.10 Conceptual Framework

The research is conceptualized on the idea that ATCs act as a midpoint between the source of agricultural information and its destination. In the ATCs farmers are trained on best agricultural practices, farming innovations, new farming technologies and latest agricultural research findings and more through class and field (demonstration)models. The farmers have an opportunity to carry out and make observations on new farming technologies at these institutions. Agricultural sector stakeholders also utilize the ATCs to reach out farmers and together with the ATC personnel they regularly organize for open days, field days and exhibitions which provide forums for farmers’ interactions. For this purpose therefore it is clear that lot of updated agricultural information is demanded in the ATC by the farmers thus it should

always be available there in its most accessible form possible. This information has to be sourced from for example from databases, websites, books, internet, course notes, libraries or any other suitable source.

Once the information is with the staff at the ATC they have to repackage and reorganize the information in a way that it is in a format that it is easily accessed and utilized by the user who is the farmer. This includes typing the notes and producing print outs, copying in flash discs and burning DVDs and CDs, PowerPoint presentations among other methods. These efforts are geared towards making trainings easier for both the trainers and the trainings and to increase sharing and future referencing. This is only possible if the ATCs have adequate ICTs and if the training personnel are equipped with the relevant skills to utilize the ICTs tools, accessories, equipment and services. Trainings at the ATCs should be aimed at meeting the farmers' agricultural training needs acting as a one stop information shop where all media and relevant ICTs should be utilized to achieve this goal. The trainers should use their ICT skills and competency to the maximum to ensure that farmers' trainings are carried out effectively addressing the most current topics as possible. However the researcher views that some technological and technical support from policy makers may be prerequisites for the success of farmer trainings in the ATCs.

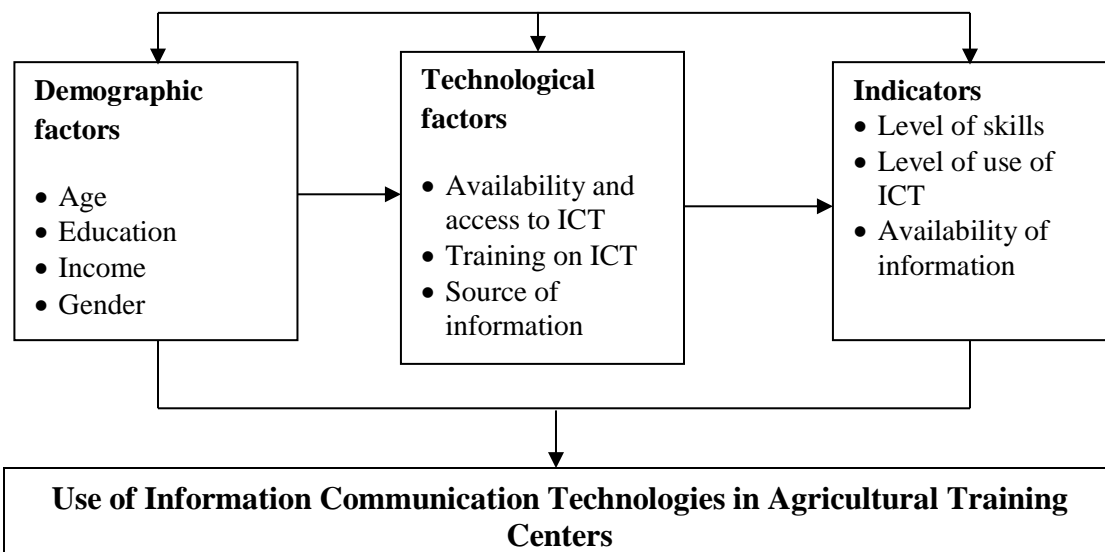


Figure 1: Conceptual framework

CHAPTER TWO

LITERATURE REVIEW

2.0 Background of ICT and Agriculture

Information and communication technologies (ICTs) generally refer to an expanding assembly of technologies that are used to handle information and aid communication. These include hardware, software, and media for collection, storage, processing, transmission and presentation of information in any format like voice, data, text and image, computers, the Internet, CD-ROMs, email, telephone, radio, television, video, digital cameras and many more. (Asenso-Okyere and Mekonnen, 2012). They provided a much wider choice in collection, storage, processing, transmission and presentation of information in multiple formats to meet the diverse requirement and skills of people. Almost every single activity in the modern world is becoming more dependent on the application of ICTs for one use or another. Through ICTs, for example, an agricultural extension officer can learn new technologies, rainfall forecasts, and commodity prices, for example and use that information to advice farmers. The importance of ICTs in development process was long recognized and access to ICTs was even made one of the targets of the Millennium Development Goal No. 8, which emphasizes the benefits of new technologies, especially ICTs in the fight against poverty.

In India, use of ICTs through the developed instructional material was found to be significantly effective in enhancing creativity, developing better understanding about environment, enhancing reading skills and reasoning amongst students (Sharma ,2005) while on the other hand Richardson (2003) said India as well as Chile had set up ‘Agricultural clinics’ which offer online services to their customers who include farmers and other stakeholders through a mobile Question and Answer (Q&A)service offering responses within one to two days. Other extension innovative approaches have emerged in other countries including: fee-for-service in New Zealand and Denmark; inclusive village level public extension service in China; market-driven empowerment through farmer groups and privatization in Uganda; farmer field schools in Asia, specialized extension agents in Ethiopia; client-oriented agricultural extension in Latin America and the Caribbean; and more recently, ICT-based agricultural extension and advisory services in Asia and Africa (Davis and Asenso-Okyere,2012).

In Africa, agriculture provides a livelihood for most of the 75 percent of the people who live-in rural areas which have the concentration of poverty and food insecurity. Therefore, any attempt

to reduce poverty should pay particular attention to transforming the agricultural sector, especially sustained improvement of land and labor productivity in the sector, facilitated by remunerative markets. Lack of technological and market information has been given as the major reason for the low productivity in African agriculture. Knowledge and information have become the major drivers of social and economic transformation in the world. Knowledge and information are now as important, if not more, factors in development, and this trend is set to intensify. Stienen, et al (2007). Specific focus on agriculture by the various sector players is gearing towards a change in agricultural extension from a process of technology transfer (research institution to farmer) to a process of facilitating a wide range of communication, information, and advocacy services (demand-driven, pluralistic and decentralized extension), Richardson (2005). This is in an effort to improve the overall livelihoods of the farmers and the farming communities. It is in the midst of this change that extension providers are grappling with the question of how best to harness ICTs. This brings the need for all participants to have an understanding of agriculturally specific ICT applications. There is no direct link that effective use of ICTs will affect agricultural productions but developing countries should strive to access their country-specific constraints and opportunities. The skills and resources of stakeholders need to be harnessed to determine, plan and implement appropriate ICT interventions to improve agriculture both at the country and at the global levels.

Agricultural education and extension can play a critical role in the transformation process to transfer technology, support learning, assist farmers in problem-solving, and enable farmers to become more actively embedded in the agricultural knowledge and information system (Christoplos and Kidd, 2000).

However many farmers especially the small-scale have complained about the unavailability of extension staff in their locality for consultation or advice. Thus the extension is urgently seeking for the best ways to support these farmers in terms of information, technology and advice.

A change is inevitable for the agricultural extension has to reach a large number of farmers and this could be possible through use of ICTs: mobile telephony, innovative community radio and television programs, mobile phones in combination with radio, video shows, information kiosks, web portals, rural tele-centers, farmer call centers, video-conference, offline multimedia CDs, and open distance learning.

At national level mechanisms need to be put in place to ensure learning and information sharing amongst farmers and the various stakeholders. Most of the agricultural information is only

available in hard copy formats or stand-alone databases making it hard to share and access. Local agricultural knowledge on best practices and lessons learnt about innovations may be hard to be captured and shared manually according to Jones, (1997). At the local level there is a huge gap between the information residing in the training centers and that with the end users who are basically farmers.

2.1 Agricultural Training Centers development

In Kenya Farmers training Centers presently called Agricultural Training Centers were established in the 1950's and 1960's after the launching of the Swynnerton Plan, which called for intensification of Africa agriculture (MOA, 2006). They were distributed all over the country to cater for the different AEZ's and currently there are 26 FTC's in the country. The Plan included a number of recommendations for agricultural education such as those for agricultural institutions after realizing that farmers who had attended trainings were showing improvements in their farming operations (Corry, 1971). The Session paper called for intensified education of small scale farmers into farming incorporating high value cash crops and livestock through adoption of high yielding technologies, thus the established of these institutions to equip the farmer with new skills/technologies through conducting intensive residential training, displaying of demonstrations for proper husbandry practices. Further, the institutions were charged with a big role in expansion of crop and animal production ensuring that farmers who wished to secure farming loans from the Agricultural Finance Corporation (AFC) had to be trained first in these institutions before funds were released. The centers have continued to play a major role in the development of both livestock and crop production through their trainings.

The vision of the ATCs is "To be Centres of excellence for training farmers and other stakeholders" and the mission is "To train farmers and other stakeholders on relevant agricultural technologies and skills through teaching, demonstrations and provision of training facilities

Overall objective of the ATCs is to provide quality training services and facilities for enhancing agriculture and development while the specific objectives includes improving access to agricultural technology and information and providing quality training facilities for Agricultural development among others. The ATCs have their functions as one, to offer residential and non-residential training on relevant farming technologies backed with practical demonstrations two, to provide training facilities to farmers and other stakeholders involved in agriculture and

development three, to maintain a model farm for training purposes and for demonstration to stakeholders in agriculture, and four, to provide facilities for and participate in carrying out adaptive on-farm trials of relevant technologies.

In 2003/2004 Financial Year, the Government decided to restructure reform and modernize the ATCs. The reforms targeted areas like staffing (have at least 6 technical and 2 support staff), farmers trainings (conduct at least 1 farmers' training per month), staff trainings(targeted trainings conducted every year focusing on subject matter specialists and other important topics),field days (hold at least 1 field day per year) and other management issues .

Modernization on the other hand aimed more on construction and/or refurbishing facilities. This saw an expenditure of more than Kshs. 30 million being spent between 2004-2008 financial years on construction or improvement of existing and new facilities and procurement of modern and more sophisticated equipment especially for ICT. The emphasis here was on setting up libraries and internet centers within the ATCs to serve as communication & resource centers .Individual ATCs were encouraged to budget for computers and library materials. The Ministry of Agriculture spelt out a strategy to improve access to information and communication technology (ICTs) in order to embrace e-agriculture. Towards this the Ministry set out to empower its training institutions throughout the country to facilitate the ICT skills upgrade. (MOA, 2010)

2.2 Information and Communication Technology (ICT)

ICT is not only limited to the textual mode of transmission of information with ease and speed .but also in audio, video or any other media. It has opened new avenues, like, Online learning, e-learning, Virtual University, e-coaching, e-education, e-journal, e-Agriculture and many other learning modules. Third Generation Mobiles phones are also part of ICT and are being used in information sharing fast and in cost effective manner. ICTs could include equipment's, tool and services. These include for example computers, TVs, Radio, diskettes, CDs, DVDs, mobile phones, digital cameras and internet.

2.3 Use of Information and Communication Technologies in Training

ICT plays a big role in making information communication processes more effective and transparent. They bring more rich material in the classrooms and libraries for the trainers and learners, provides opportunity for the learner to use maximum senses to get the information and has broken the monotony and provided variety in the teaching – learning situation. The ICT

being latest, it can be used in schools and other training institutions for example to aid in teaching, evaluation, online tutoring, research development and instructional material development. (Mwalongo, 2012)

Training, apart from impacting knowledge and delivering information to the learners, has a wide range of objectives including: developing expression power; developing reasoning and thinking power; development of judgment and decision making ability; improving comprehension, speed and language; developing self-concept and value clarification; developing proper study habits; and developing tolerance, risk taking capacity, survival mechanisms.

With the present infrastructure, training facilities, staff availability, their level of training and farmers training needs it is difficult to achieve all the objectives. Further, most of the training personnel use training methods which do not have the potentiality of achieving majority of above mentioned objectives. The objectives are multi-dimensional in nature, so for their achievement multiple methods should be used in an integrated fashion. At present incorporation of use of ICTs in trainings may provide this missing link.

Use of ICT could provide access to different sources of information correctly and as comprehensively as possible in different formats with different examples. ICTs provide online platforms including internet, blogs, websites and databases which enable interaction facilities amongst the users. Trainers and their clients can exchange ideas, engage in Q&A and maintain feedback sessions thus broadening their information base. (Glendenning, et al, 2010)

ICTs provide variety in the presentation of content which helps learners in concentration, better understanding, and long retention of information which is not possible otherwise. ICT provides flexibility to learners which are denied by the traditional process and method which is a must for practical and quality learning. Computers for example are immensely powerful training tools. They have the ability to enable interactivity in a multimedia (sound and vision environment, to connect different people in different places and to store vast amounts of the information in a small space, thus transforming the whole training environment and practice. (Unwin, 2004)

The Constitution of Kenya identifies capacity building and technical assistance to the counties and guarantees right of access to information held by the State or by another person that is required for the exercise or promotion of any right or fundamental freedom (Republic of Kenya, 2010). In line with this, the Ministry of Agriculture, as a government agency, promotes use of ICTs in the dissemination of its extension services. This is achieved through the training function

that is effected through Agricultural Training Centres (ATC's), among other training institutions. The overriding challenges include mobilization of resources to provide training services, low application of technology (MOA, 2008).

In application of contemporary science and technology, the Ministry of Agriculture aims at reforming and enhancing the support of agricultural institutions so that they can provide new technologies of improved varieties, agronomic packages, and sustainable land use systems (MOA, 2008). This Strategic Plan (2008-2012) indicates that the Ministry has made deliberate efforts to support frontiers of science such as biotechnology, agronomic modeling and Information Communication Technology (ICT) as tools for greater agricultural development and food security.

2.4 Level of ICT skills

ICT skills are the skills needed to be able to design, develop, implement, support and manage computer based information systems. It involves the ability to use electronic computers and computer software to convert, support, protect process, and transmit and security retrieve information. An international panel convened by the Educational Testing Service (ETS) in January 2001 to study the growing importance of existing and emerging ICTs and their relationship to literacy defined ICT literacy as the ability to use “digital technology, communication tools and/or networks to access, manage, integrate, evaluate and create information in order to function in a knowledge society”. The Information and Communication Technology (ICT) literacy is a critical skill set for students involved in an ICT-mediated learning environment (Sansanwal, 2009).

Research attempting to benchmark ICT literacy skills conducted by Oliver and Towers (2000) indicated that lack of appropriate ICT literacy skills among the trainers could impede learning and their progression in courses and programmes. According to Sife and Sanga, (2007) categories of ICT users are based on competencies most agricultural trainers in the agricultural institutions could be classified in the basic users category. These are the competent users of generic tools (*e.g.* Word, Excel, Outlook, PowerPoint) needed for the information society, e-government and working life. Here, ICTs are a tool, not the main job and thus skills are needed to efficiently use the elementary functions of information and communication technologies (essentially word/image/data processing, Internet and e-mail).

The Ministry of Education panel further provided the operational definition for the key concepts of their ICT definition: Access – knowing about and knowing how to collect and/or retrieve information; Manage – applying an existing organizational or classification scheme; Integrate – interpreting and representing information. It involves summarizing, comparing and contrasting; Evaluate – making judgments about the quality, relevance, usefulness or efficiency of information; and Create – generating information by adapting, applying, designing, inventing or authoring information (Sansanwal, 2009).

Outstanding researches in the area of agriculture have shown that a well-trained human resource can provide a substantial productivity and this can only be possible through a well-timed agricultural training delivered targeting different groups and levels with a decent collaboration of education, training and agricultural policy of a country (Ashley & Maxwell, 2001)

The importance of ICT-skills lies in the fact that in today's world a large package of information goes through Internet providing the user with a decentralized, widely distributed, packed based system. It is though very important to be able to access this and other means of electronic communication systems.

In the emerging digital economy, human resources are the critical factor behind success (Leppimäki et al., 2001). Therefore, scarcity in skills or in skilled personnel can pose a serious threat to knowledge intensive branches, such as the Information and Communication Technology (ICT) sector. The quantity and quality of skills have been important issues especially in the high growth development phase, which the ICT sector in many countries has gone through. But quantitative skills shortage and qualitative skills gap could still threaten the further positive development of the ICT sector.

Electronic Government is a process that governs the provisions of public products, services and information and so one of the main requirements for the e-Government agencies is to have the ability to access, absorb, share and use information and knowledge efficiently. In order for e-Government to function properly it needs to build an effective ICT force that is able to provide a well working system. This means that citizens should be able to find what they need quickly and easy and access information in minutes or even seconds. Knowing how to operate such a system requires managerial capabilities and the abilities to operate any computer system. A system that is run by less skilled people can lead to a communication breakdown which can create serious problems that technology cannot solve (Ndung'u and Waema, 2011).

2.5 Available ICT equipment at ATC's

The process of innovation involves getting new ideas accepted and new technologies adopted and used (Tatnall and Davey, 2003). The application of information and communication technologies (ICT) for learning and training has great potential to produce significant changes in educational practice Ben-Jacob, et al (2000) and Naidu, et al 2002), but for this to occur the technology first needs to be accepted and adopted. This calls for identification of appropriate digital tools and equipment for use in offering ICT related courses and trainings by ATC's.

A list of some ICT equipment identified by the Ministry of Agriculture, Kenya, for supply to training institutions, include: desktop computers, Uninterruptible Power Supply (UPS), Laptop, mouse, word and spreadsheet processing software, antivirus protection, external hard drive for backup, internet connection hardware, multi-function printer, print cartridge, mobile worktable, storage devices (flash disks, CD/DVD/VCD), Central Processing Unit (CPU) and monitors (MOA, 2008). On the other hand UNESCO (2003) mentions the following ICTs as those which could be used as audio visual aids used in training: overhead projector, television, VCR, video projector, digital cameras, scanners, telephone, radio, tape recorder, computer, CD player, internet & local area network (LAN), world wide web, slide projector, film strip projector, simulators, graphical interfaces, online publishing, printed materials, chalk board, electronic board, one or two way video, satellites and interactive television.

Some of the application software includes productivity software, word processing, integrated software, spreadsheet, database, graphics applications, graphics software, presentation software, desktop publishing, discipline-specific programmes, simulations and authoring software.

A list of equipment, accessories and software found in the Agricultural Training Centres is yet to be established as the institutions are at different level of modernization and digitization. This project work proposes to document this for future use and reference.

The above analysis shows there is little to show for the recorded findings regarding the Information and Communication Technologies used or offered by ATC in training and there is need, therefore, to investigate and document the types and usage of digital technologies mounted by these training institutions in the Ministry of Agriculture.

2.6 Level of Information and Communication Technologies use in training in Agricultural Training Centres

In today's world it is ICT, innovation, human capital, work organization and other intangible assets that are most important for firm performance (Hans-Olof et al., 2008). It is also equally important to economic growth and living standard and thus to policy development. Some basic levels of ICT use have been described to assist one determine the level of operation and include: use ICT to save information and to find and use appropriate stored information, following straightforward lines of enquiry; use ICT to generate, develop, organize and present your work; share and exchange your ideas with others; use sequences of instructions to control devices and achieve specific outcomes; make appropriate choices when using ICT-based models or simulations to help find things out and solve problems; and describe one's use of ICT and its use outside school/training institution (Mwalongo,2012).

The problem of ICT usage includes among other things organizational, informational and educational aspects where : Organizational involves the legal aspects and procedures of obtaining and processing all the necessary data, Educational deals with description and evaluation of the content while Informational is concentrated on the necessary procedures of information maintenance and provision. The indicator problem is also a multilevel one as the education system can be considered on regional (sub regional), national, local level and the level of educational institution.

Besides their potential to aiding in training for anyone, anytime and anywhere, ICTs have encouraged new research and development in teaching and learning techniques. As stated by Raihan and Shamin (2002), Schank, the founder of Cognitive Arts, believes that learning institutions must adopt a new way of training, claiming that people "learn better through experiential and emotional learning rather than through memorizing names and dates" and thus educators must simulate real-world environments.

There are a variety of different technologies that can be used in training and each of these technologies has its own redeeming qualities and limitations, and different situations call for different technologies (Ndung'u and Waema, 2003). These ICT technologies available for use include: Audio-cassette tapes, radio, videotapes, CD-ROM and DVD, Internet/Web-Based Training, Web-Based Training (WBT) Programmes, Audio Conferencing, Audio graphics, Interactive Television, and Video Conferencing (Sansanwal, 2009).Unwin,2004 in his paper writes that on the general a set of principles need to be in place for ICTs to be effectively used in

trainings and that for trainings to reap the full benefits of ICTs use it is essential that trainers receive pre-service and in service basic ICT skills and competences. To harness the power of the new technologies staff working in the agricultural training centers need to exhibit higher level of competence because the success of the use of the ICTs will depend largely on the orientation and sensitivity of the people who serve the needs of the farmers .(Meera *et al*, 2004)

Education policy makers and planners must therefore be clear about what educational outcomes are being targeted. These broad goals should guide the choice of technologies to be used and their modalities of use for which the potential of each technology varies according to how it is used. Haddad and Draxler (2002) identify at least five levels of technology use in education: presentation, demonstration, drill and practice, interaction, and collaboration. Use of ICTs can thus be used to motivate learning, facilitate the acquisition of basic skills and enhance teacher training in a learning environment. This is possible as the technologies promote learning that is active, collaborative, creative, integrative and evaluative.

There exists a lot of literature on use of ICTs in trainings and teaching of students in learning institutions but there is low documentation on the same for Kenya particularly for learning institutions of the category of Agricultural Training Centres. These institutions, as much as they are hosted by the ministry of agricultural serves farmers from all over the country, of all age groups and education levels. There has been fast technological advancements and developments in the country over the past few decades and it would be naïve for any researcher to think that the ATCs have been spared challenges in uptake of the ICTs use.

CHAPTER THREE

METHODOLOGY

3.0 Research design

The researcher adopted a case study to carry out an in-depth investigation (Mugenda and Mugenda 2003) of the ATCs in the central Kenya region with the aim that the findings obtained will represent the scenario in the other ATCs in the country. The research is based on the assumption that results obtained from the region will represent the other ATCs in the other parts of the country due to the uniformity of operations and structure. Questionnaires were the main tools of data collection used.

3.1 Description of the area of study

The research was carried out in Central Kenya targeted all the six ATCs from the region. These include: Wambugu Farm in Nyeri County, Waruhiu in Kiambu County, Kamweti in Kirinyaga County, Mariira(Kenyatta) in Murang'a County, Njambini in Kiambu County and OlJoro Orok in Nyandarua County. The ATCs have their history dating back to 1958 for Wambugu and Waruhiu, 1960 for Kenyatta, 1964 for Njabini, 1975 for Ol Joro Orok and 1976 for Kamweti, all under the Ministry of Agriculture and with the farmer training mandate.

Central province (as was formerly known) is popular for its high agricultural potential, high numbers of farming families and good infrastructure. The ATCs in this region borders to the east Kitui ATC, Machakos ATC, Kaguru ATC, Isiolo ATC and Embu ATC, to the south Ngong ATC and former Kabianga ATC (MOA, 2008)

Central Kenya is the only region in the country that uniquely lies in almost all the agro ecological zones(AEZ) that is from Tropical Alpine (TA) , Upper and Lower Highland Zones (UH,LH) ,Upper and Lower Midland(UM,LM) to Lowland zones(LL).The land forms include flatlands, slopes (between 12%-55%)and rocky /stony areas. Soils vary as per the AEZ and include clay, clay loams, sandy soils among others which are suitable for wide variety of crops and animal production. The area is suitable for food crops for example maize, beans, cassava, sweet potatoes, cash crops: coffee, tea, macadamia. Animals reared in the region include, dairy cows and goats, sheep, horses, beef cows and goats, donkeys just to mention a few. (MOA, 2007).The ATCs were initially strategically started in the eight regions (formerly eight

provinces) all over the country to take advantage of educating African farmers on best farming practices to position themselves to take up farming after the land demarcations following independence.

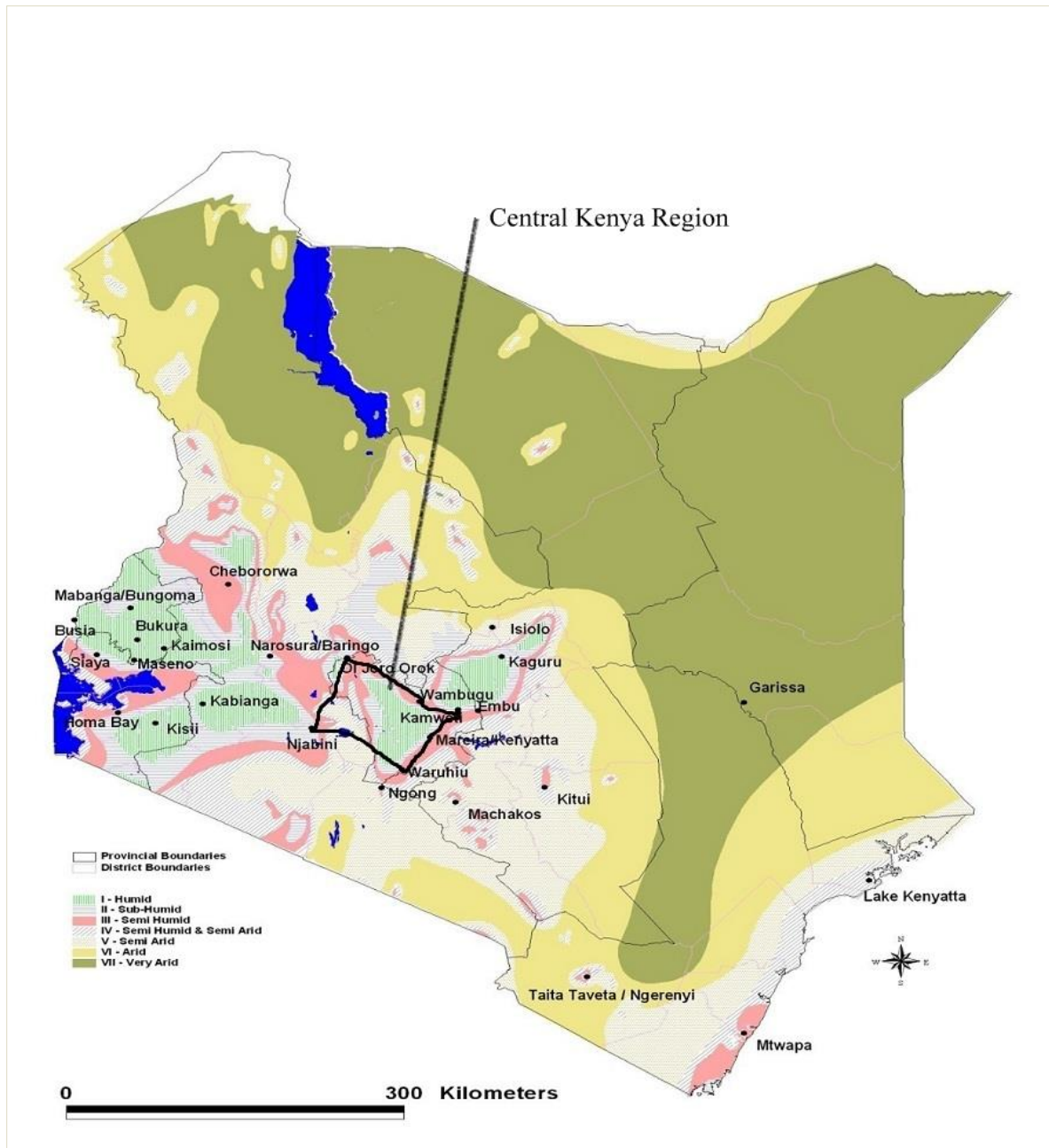


Figure 2: Map of Kenya showing ATC locations
(Source: Ministry of Agriculture annual report, 2008)

3.2 Target population

The study was concentrated on all the technical and support staff with access to ICT's within the six ATCs in Central Kenya from the categories of principal, deputy principal, farm manager, crops officer, livestock officer, agro processing officer, home economics/cateress officer and clerks.

3.3 Sampling

Enquiries made from the Head ATCs Subdivision in the Ministry of Agriculture Headquarters revealed that there are 27 ATCs all distributed sparsely in the country in the former 8 provinces that is Eastern(5), Central(6), Western(3), Rift Valley(3), Nyanza(3), Western(3), Coast(3) and North Eastern(1) (former administrative boundaries).

The study adopted a purposive sampling technic with the central Kenya region being purposively selected for this study for various reasons. First the area has the highest number of ATCs as compared to other regions, second the ATCs in the region were in the pilot project of communication networking that is currently being undertaken for all the ATCs, thirdly as a result of the high number of institutions the research assumed the area was likely to offer an adequate sample size and lastly the region lies in high potential and highly populated area thus has a high demand for agricultural trainings in the ATCs.

3.4 Sample size

The research also studied the human resource records and gathered that each of the ATCs has about 10 personnel members to make 60 for the six ATCs selected for the study.

To determine the desired sample size from the target population, Cochran (1977), formula for calculating sample size is used. The formula is indicated as:

$$n_o = z^2 pq / d^2$$

Where:

n_o = desired sample size

z = standard deviation (1.96) which corresponds to 95% confidence interval

p = proportion of the target population of respondents who access ICTs for trainings

q = 1-p

d = degree of desired accuracy set at 0.05

$$n_o = \frac{(1.96)^2 (0.9) (0.1)}{(0.05)^2}$$

$$n_o = 138$$

For this population of 60 (indicated above) the required sample size is 138 which exceeds 5% of the population ($60 \times 0.05 = 3$), Cochran's (1977) correctional formula is used to calculate the final sample size:

$$n = n_o \times \frac{N}{N + n_o}$$

Where;

N = uncorrected population which for this study was 60

n = corrected sample size

$$n = 138 \times \frac{60}{60 + 138}$$

$$n = 138 \times 0.0303$$

$$n = 41.8$$

$$n = 42$$

Therefore the minimum sample size (corrected) is 42. The researcher purposively sampled all the technical staff in the six ATCs to participate in the study, namely: six principals, six deputy principals, six farm management officers, six crops officers, six livestock officers, six home economics officers and six agro processing officers with clerical officers participating where some cadre of officers were completely missing. This was due to the fact that these are the officers who use the ICTs regularly for training purposes.

3.5 Data collection

The research was carried out using structured questionnaires incorporating both closed and open ended questions. The names and contact details of the six ATCs and their Principals in central Kenya were obtained from the Ministry Headquarters offices. The questionnaires were administered by the researcher to each respondent taking a minimum of 1 day in each ATC.

3.6 Data Analysis

Data collected was both qualitative and quantitative and descriptive statistics was used for analysis. Data was presented using tables and figures. Statistical package for social sciences (SPSS) version 21 was also used to aid in data analysis for easy and clear presentation.

CHAPTER FOUR

RESULTS

4.1 Demographic Factors

4.1.1 Distribution according to gender

The sample consisted of 27 staff members from the six ATCs in central region of Kenya. Of this sample size 19 were males and 8 females as shown in (Fig. 1) below.

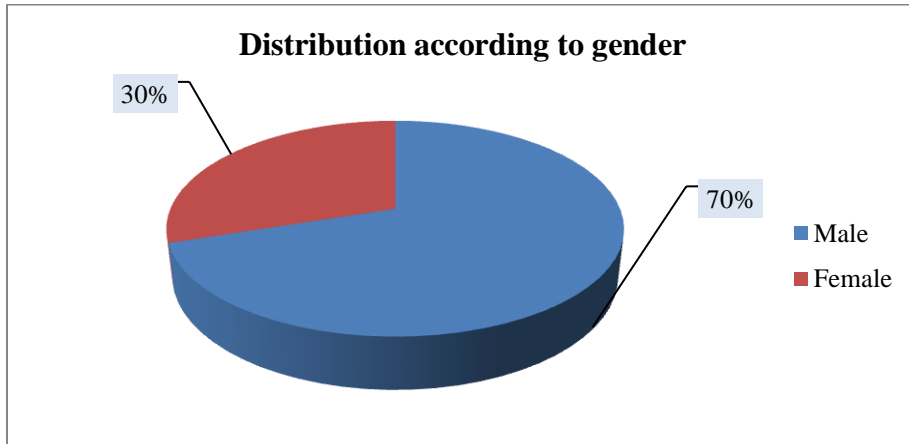


Figure 3: Gender

4.1.2 Distribution according to Age

Most of the respondents were in the age bracket of 36-50, followed by those who were between 18 – 35 with the least group being between 51 – 60, as shown in the figure below.

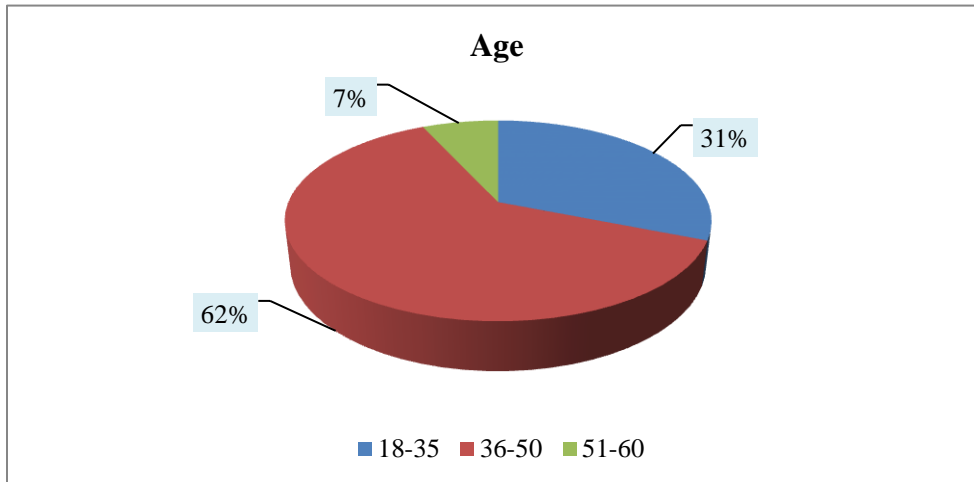


Figure 4: Age of respondents

4.1.3 Distribution according to level of education

Majority of the respondents had diploma education, followed by those with A-level certificates. Bachelor's and master's degrees registered the lowest respect. (fig.3)

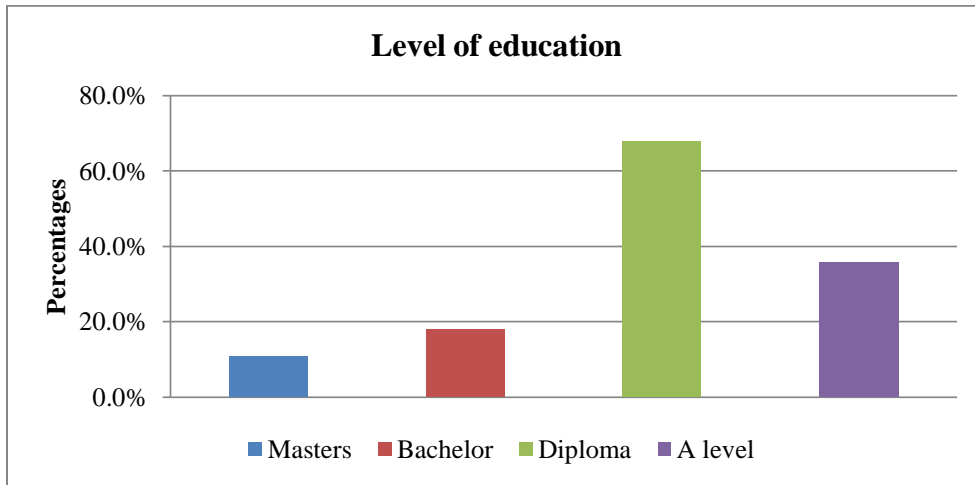


Figure 5: Level of education

4.1.4 Distribution according to deployment

Majority of the respondents were deployed as farm managers and crops officers tying at 18.5% followed by principals and training officers at 14.8%. Livestock officers were at 11.1% while the others including cateresses, clerks and agro processing officers stood at 7.4% each. (fig.4)

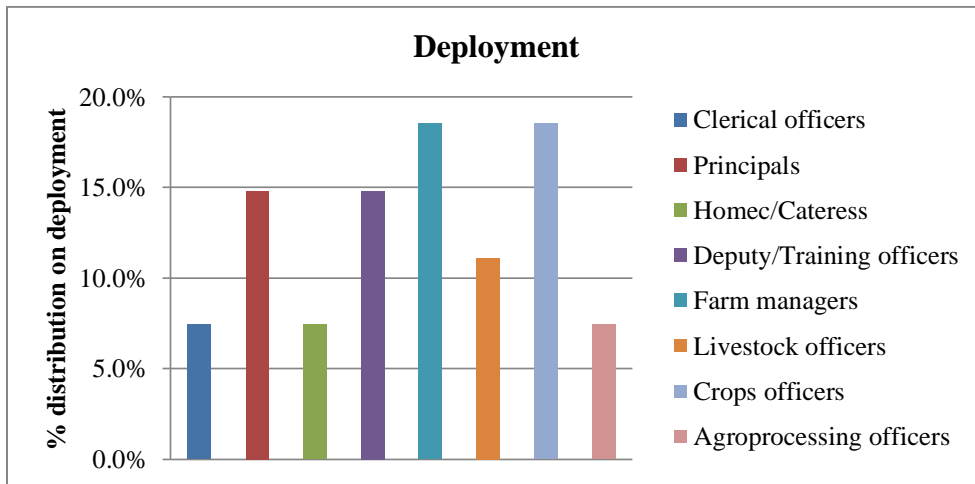


Figure 6: Deployment

4.1.5 Distribution according to registration in social media

A total of 55.6% of the respondents are registered in social media while the remaining 44.4% are not registered.

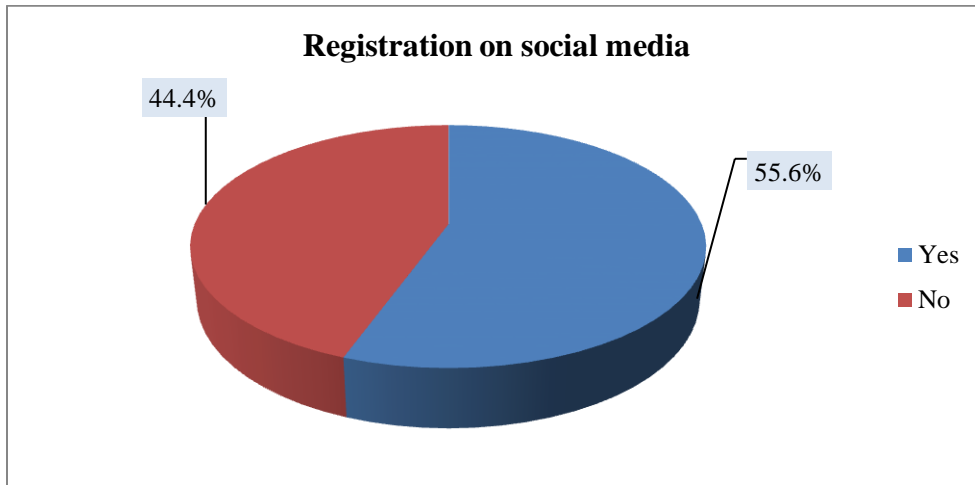


Figure 7: Registration in the social media

4.1.6 Distribution according to types of social media

Out of the 55.6% of the respondents registered in the social media 37.5% were in face book, 25% in twitter, 12.5% were both in yahoo and WhatsApp while Skype and Gmail had 9.4% and 3.1% respectively.

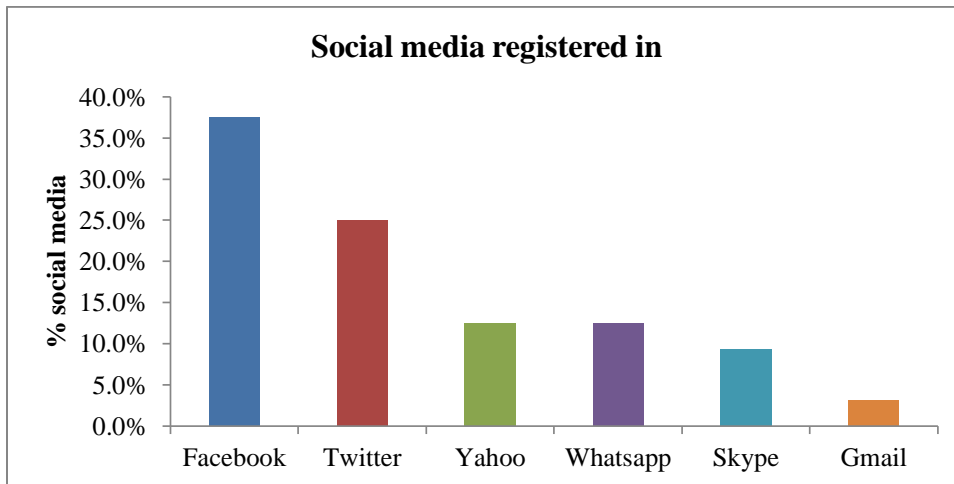


Figure 8: Types of social media

4.2 ICT Facilities

4.2.1 Distribution according to ICT facilities in the ATC

Within the six ATCs in the central Kenya region desktops and printers topped the list of available ICTs at 100% followed by laptops at 90%, radio /TV sets and modems at 86%, wireless phones at 83%, photocopiers at 69%, internet /email at 66%, scanners at 48%, office mobile phones at 45% and satellite dishes at 11%.

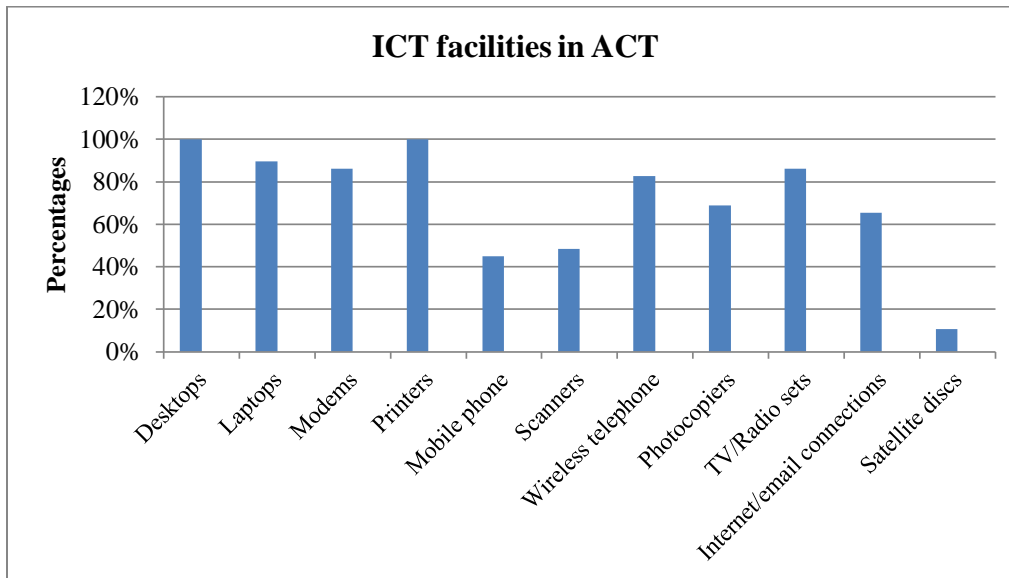


Figure 9: Types of ICT facilities

4.2.2 Number of ICT facilities

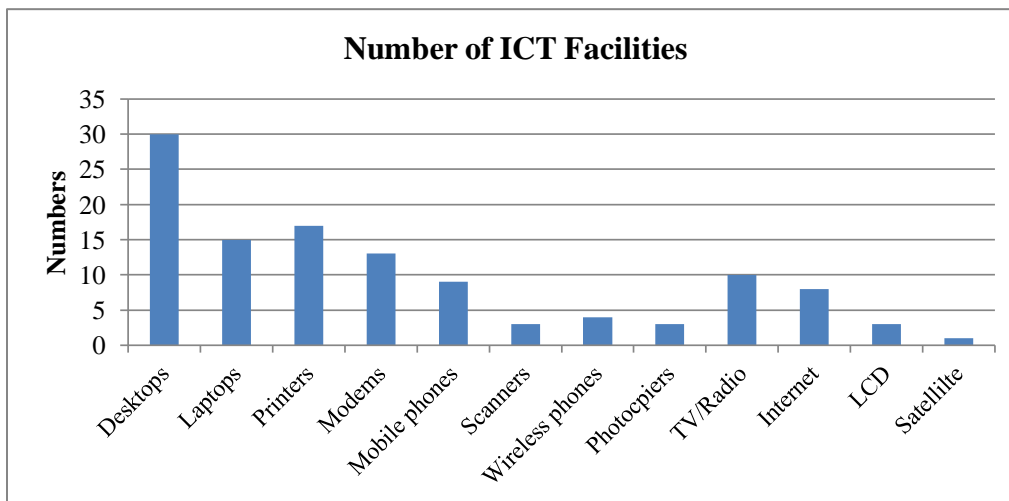


Figure 10: Number of ICTs

4.2.3 Mostly used ICT facilities

Majority of the respondents ranked the desktop, laptop and modems as the easiest ICTs to use in that order which translates to 39.9%, 13.1% and 7.2% respectively. Others that followed were printers, CCTV, mobile phones, photocopiers, scanners, wireless telephone and satellite dishes while the internet was the least used.

Table 1: Use of ICT facilities

ICT FACILITY	Responses	
	Rank	Percent
Desktop	1	39.9%
Laptop	2	13.1%
TV/Radio	3	7.2%
Modems	4	6.3%
Printers	5	6.0%
CCTV	6	5.8%
Mobile phone	7	5.4%
Photocopiers	8	4.1%
Scanners	9	3.7%
Wireless telephone	10	3.5%
Satellite dishes	11	2.7%
Internet connections	12	2.3%
Total		100.00%

4.3 Level of ICT Skills

4.3.1 Distribution according to ICT course

In terms of those who have taken a course in ICT, it was found that 82% of the respondents had some training in ICT while 18% of the respondents had not taken a course in ICT.

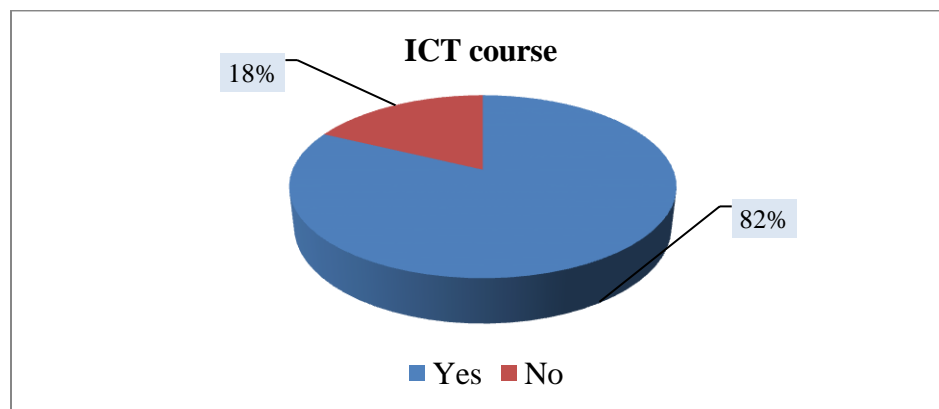


Figure 11: Distribution according to ICT course

4.3.2 Distribution according to ICT training

Out of the 82% majority had taken introduction to computers, followed by PowerPoint, MS word, and Excel with the least numbers having taken a course in Outlook.

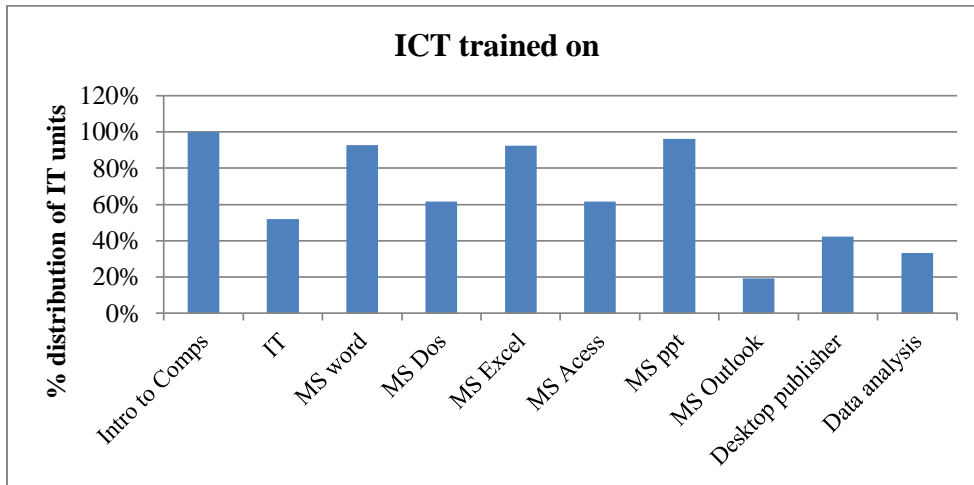


Figure 12: Distribution according to ICT trained on

4.3.3 Distribution according to IT trainer

The respondents gave different information regarding their trainers on ICT. Most of the respondents 70.3% were trained by the tutors. This was followed by 10.8% who said that they learnt most of the packages by themselves since they had access to computers. The rest got their training from friends and workmates and were both at 8.1%. The remaining 2.7% learnt through online courses.

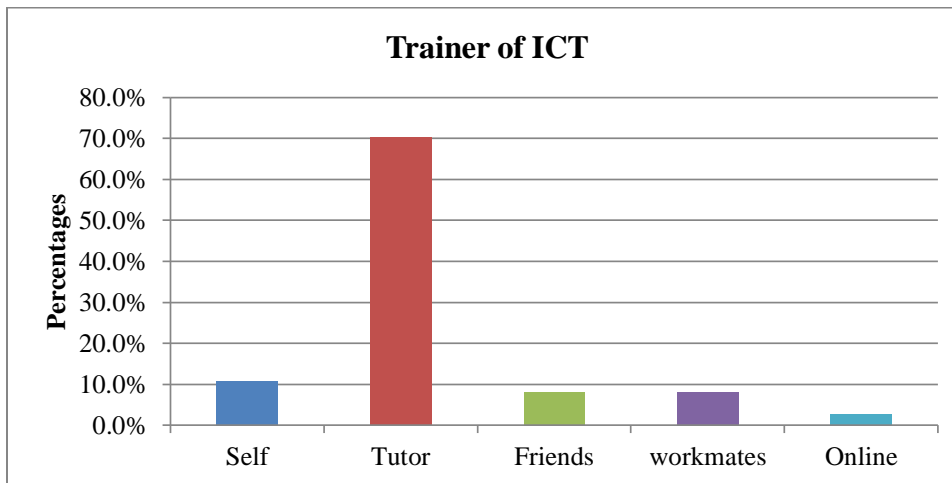


Figure 13: Distribution according to IT trainer

4.3.4 Distribution according to competence in computer packages

Highest level of competence in computer packages, rated as excellent was realized among 15.8% of the respondents. Those who were rated as good were the greatest majority with 40.2% of the respondents. The fair ones were at 22.2% while the remaining 21.8% were rated as poor.

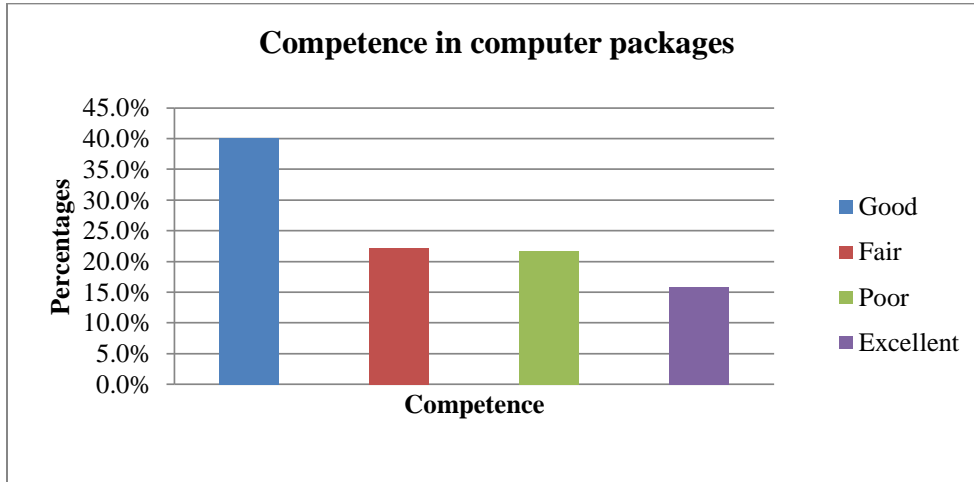


Figure 14: Competence in computer packages

4.3.5 Distribution according to location of use of computers

Majority of the respondents 45% accessed from the main office. The other 22% accessed from their own office while 11.9% accessed the computers from the colleagues offices. From the conference hall there were 10.2% were accessed the computers. Computer lab and the library were both at 5%. The remaining 3.4% accessed the computers from their homes.

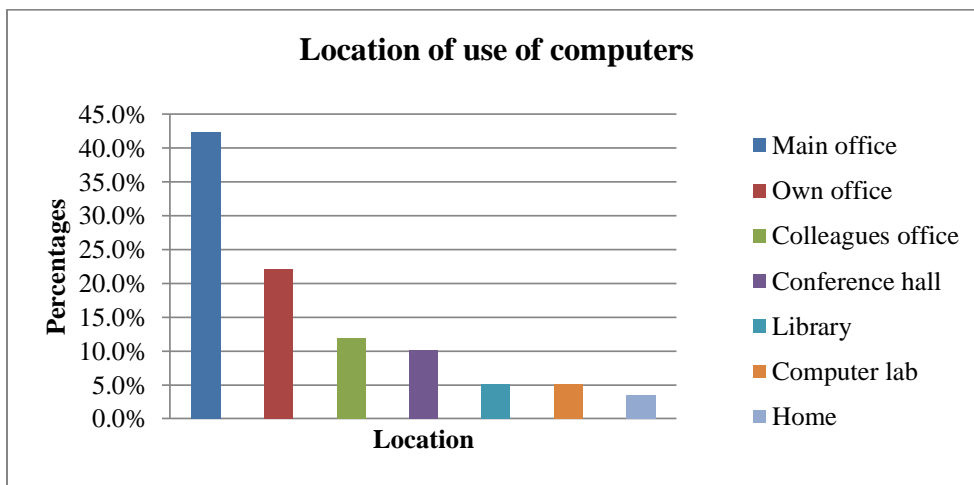


Figure 15: Location of computers

4.3.6 Distribution according to computer officer ratio

Majority of the respondents said that the ratio between computers and the officer is 1:2 i.e. two officers are assigned one computer, and this was identified by 42.9% of the respondents. Those who shared one computer amongst 5 people were at 21.4% and this was followed by those who shared the computer amongst 3 people at 17.9%. Others had a computer at a ratio of 1:1 and were 10.7%. The last group shared the computer at a ratio of 1:4 and was at 7.1%.

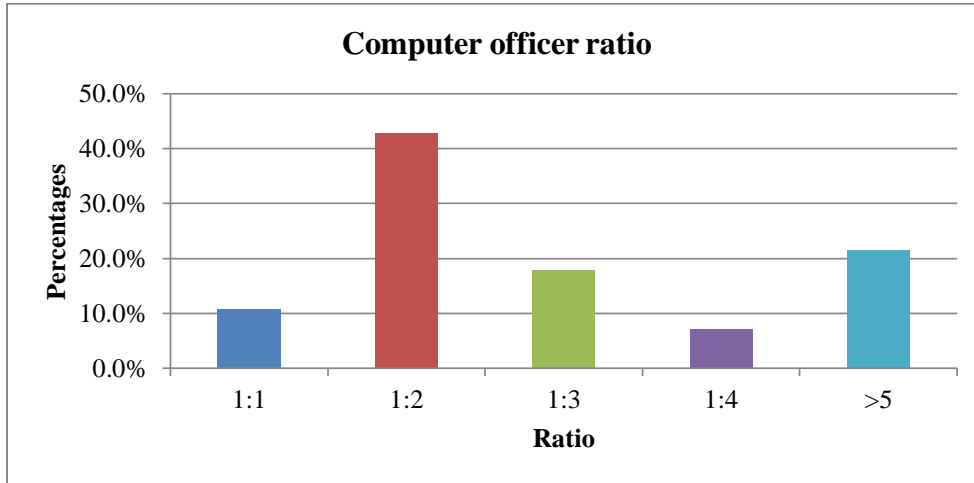


Figure 16: Computer officer ratio

4.3.7 Distribution according to common activities performed by computers

Most of the respondents, 30.5% used computer for writing reports. Research was also noted among 25.6% as one of the common activity. For internet services, it was noted among 23.2% of the respondents. The other 13.4% used the computers for listening to music and watching movies while 4.9% used the computers for playing games. Other activities like data analysis and storage of pictures were at 5%.

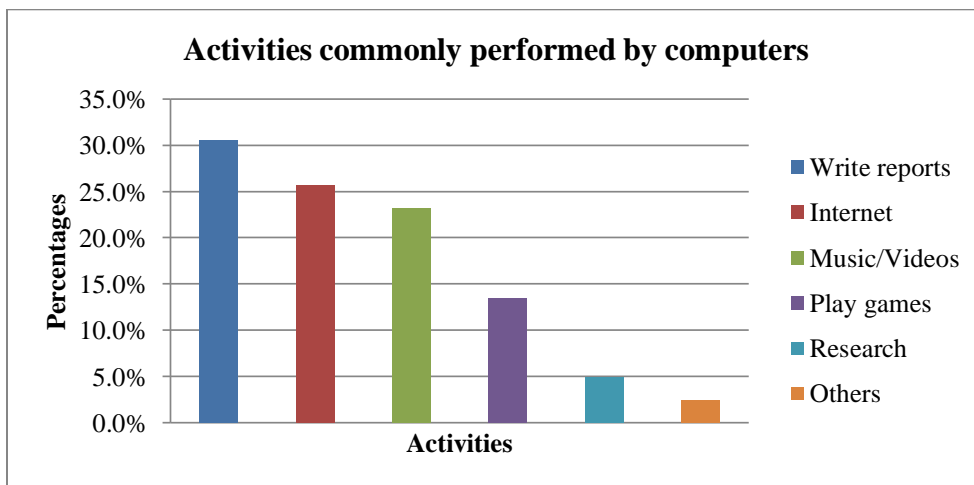


Figure 17: Common activities performed by computers

4.3.8 Distribution according to presence and availability of internet for use

70% of the respondents had internet in the ATC while 30% did not have. In terms of use of the internet services, there was a good response in the sense that those who had it were also able to use it as was noted among 67.9% of the respondents. Those who did not have access to use were only 32.1%. (Fig)

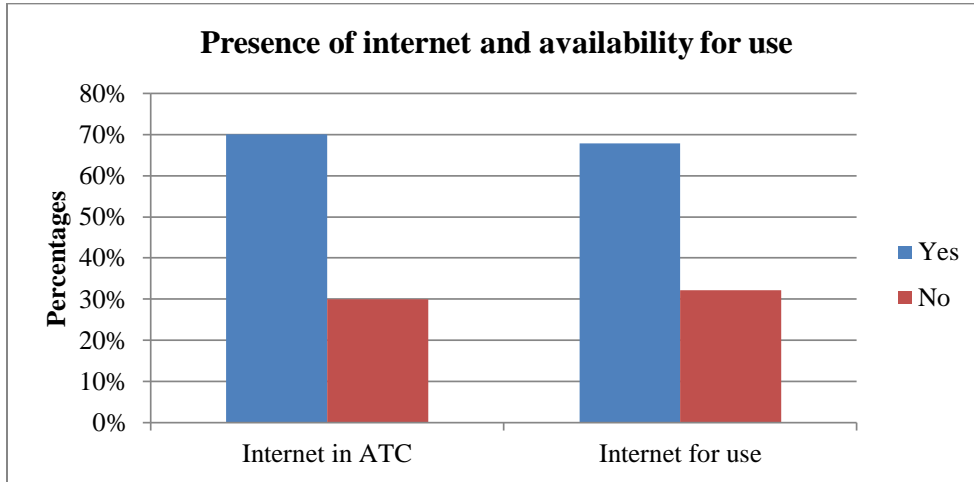


Figure 18: Presence of internet and availability of use

4.3.9 Distribution according to frequently visited sites

Most of the respondents, 41.7% frequently browsed the web. This was followed by those who used the mail services at 36.7% while the other 16.7% frequented the chatting sites. The last group at 5% visited data bases frequently.

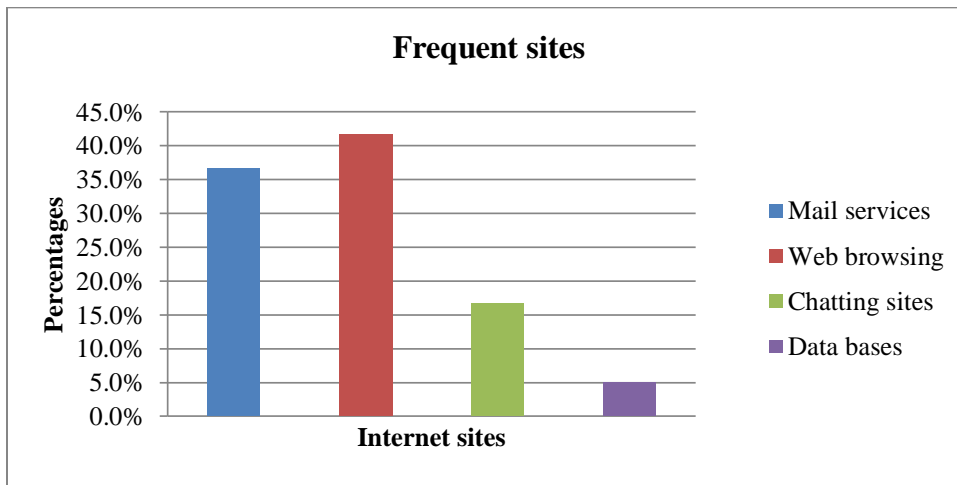


Figure 19: Frequent visited sites

4.3.10 Ranking of activities performed within the net

From the figure below, most of the respondents use internet for research at 28.6% followed by sending mails at 17.7% then chatting came third at 15.7%. The last category was entertainment, downloading and others at 15.3%, 13.3% and 9.5 respectively.

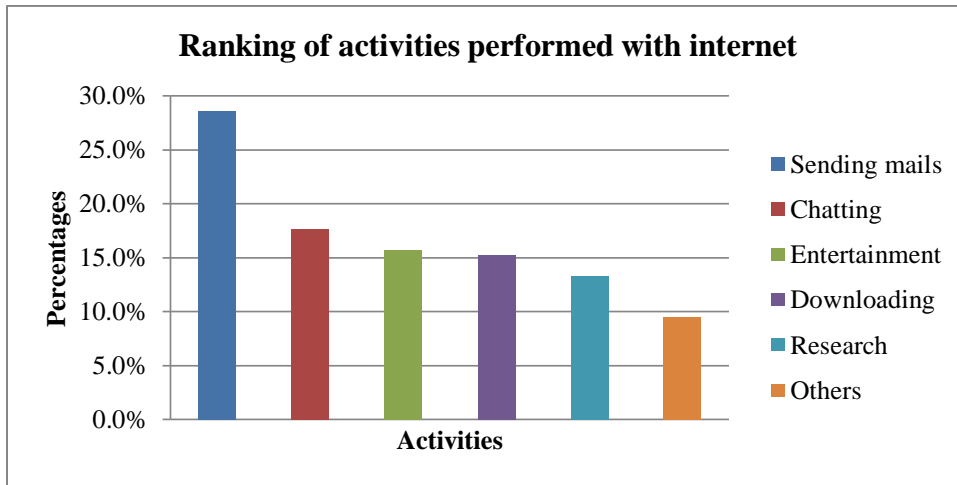


Figure 20: Activities performed with the net

4.3.11 Distribution according to frequency of access of sites

Most of the respondents access the sites weekly at 42.4%, daily at 20.7%, monthly 14.1%, never at 10.9%, quarterly at 9.8% and yearly at 2.2%.

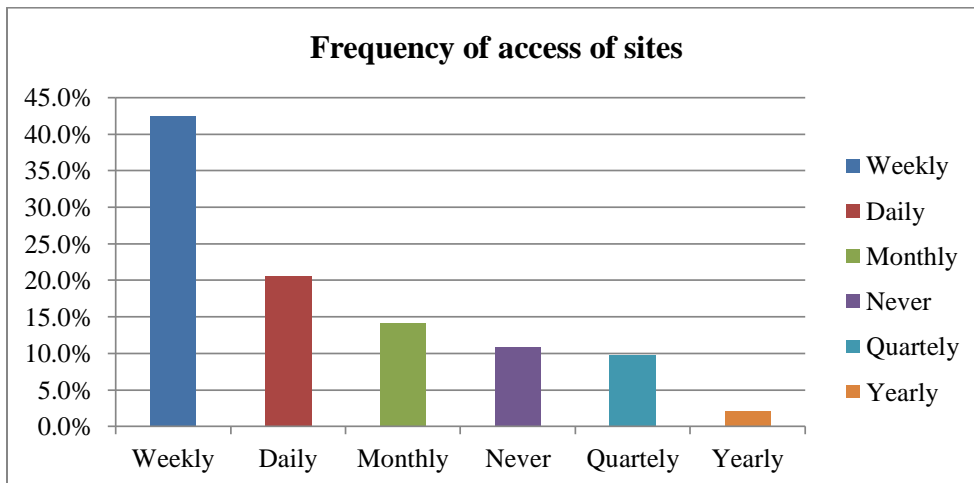


Figure 21: Frequency of access of sites

4.4 ATC Trainings

4.4.1 Distribution according to types of training in ATCs requiring use of ICTs

Animal production was identified by 27.5% of the respondents as the training requiring ICT. This was followed by agro-processing which was mentioned by 21.7% of the respondents followed by greenhouse technology at 20.4% while crops production and farm management at 17.4% and 13% respectively.

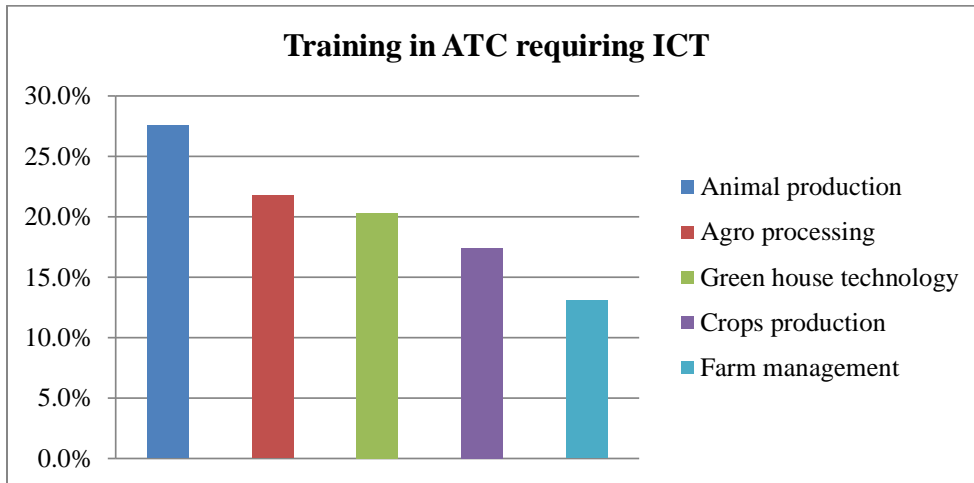


Figure 22: Types of training in ATCs requiring use of ICTs

4.4.2 Distribution according to type of ICT used

The ICT equipment identified for use in the ATC during the trainings were computer at 32.4%, followed by LCD projector at 29.6% while photocopier, modem and printers were all at 12.7% as identified by the respondents.

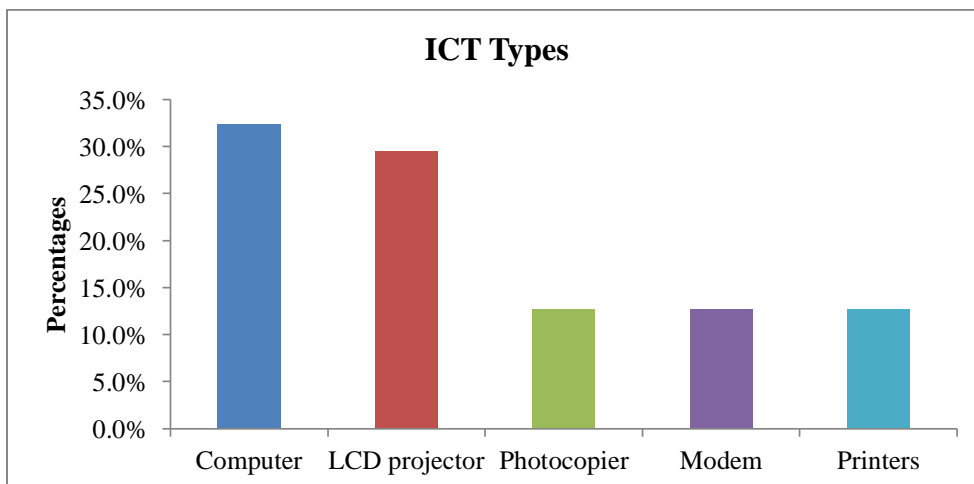


Figure 23: Types of ICT used

4.4.3 Duration of training

According to 26.9% of the respondents, mostly the trainings were done for one week and for two days. The other 23.1% of the respondents said that the trainings take place for three days while 11.5% were both for one day and more than a month.

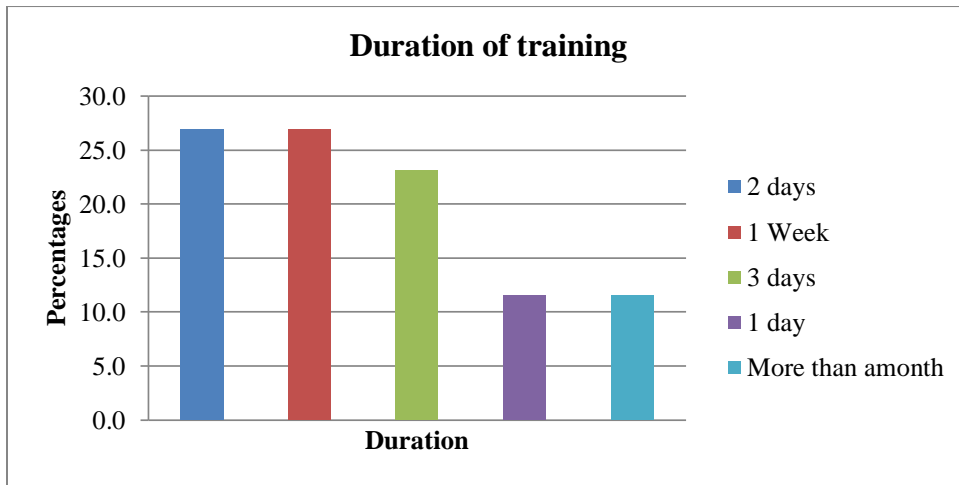


Figure 24: Duration of training

4.4.4 Distribution according to frequent customers in the ATCs

Majority of the customers in the ATC were noted to be mixed gender group as was indicated by 85.2% of the respondents. This was followed by school children who come for agricultural lessons at 7.4%. Youth groups and women groups were both at 3.7%.

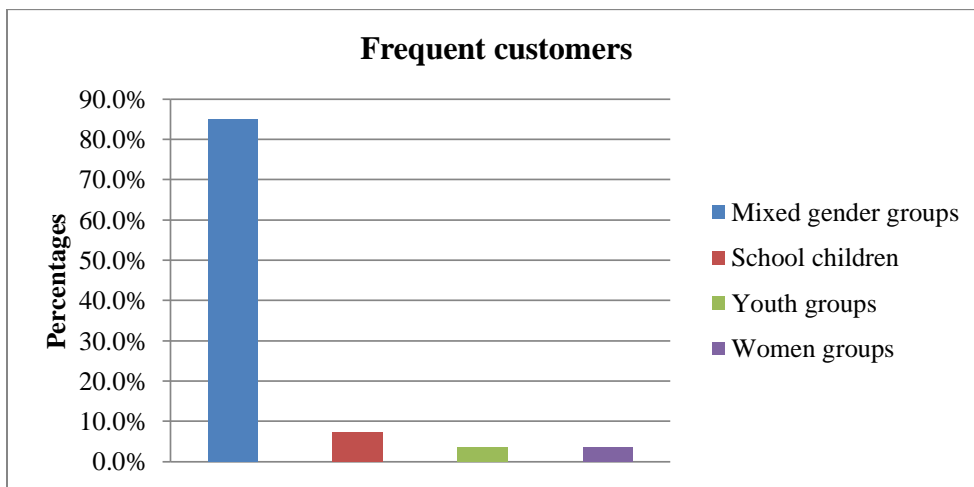


Figure 25: Frequent customers in the ATCs

4.4.5 Distribution according to age of the customers

Most of the respondents 57.1% indicated that those who are between 20-40 yrs. old were the main visitors at the ATC. The next category was greater than 60, represented by 35.7%. This was followed by those who are between 40-60 years while the least category was less than 20yrs old.

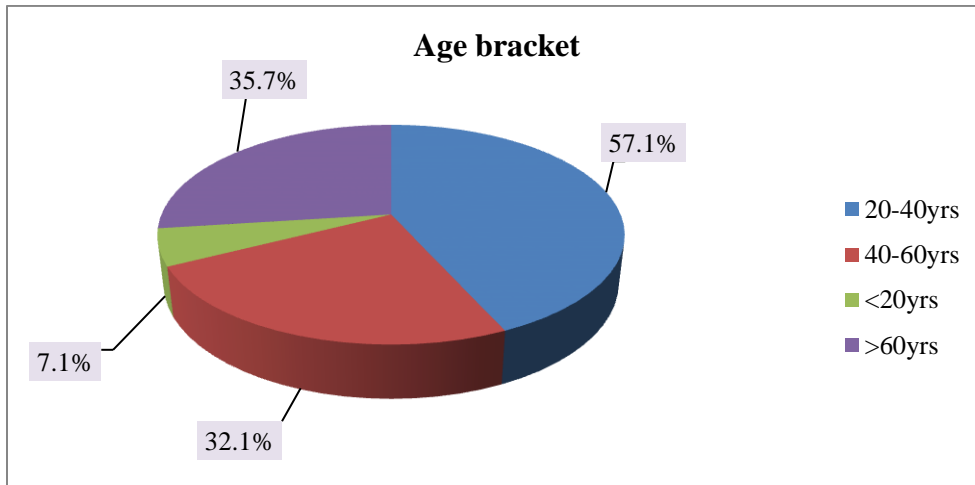


Figure 26: Age of customers

4.4.6 Trainee level of education

Most of the respondents at 78% have attained a secondary education followed by primary at 18% and then the degree and above had the least at 4%.

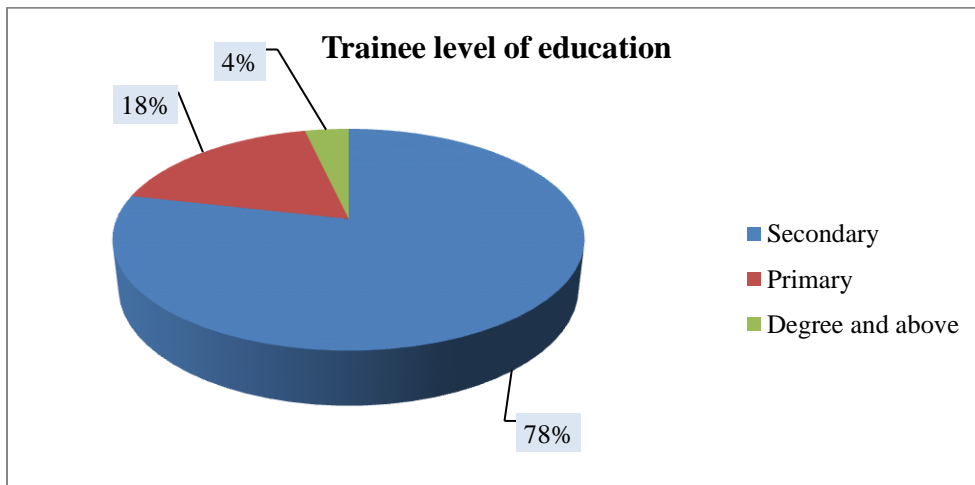


Figure 27: Level of education

4.4.7 Instances of trainees being ahead in some subjects

Widely held opinion was that there are instances where the trainees are ahead of the trainers in some topics. This was noted among 71% of the respondents while the remaining 29% were of the contrary opinion.

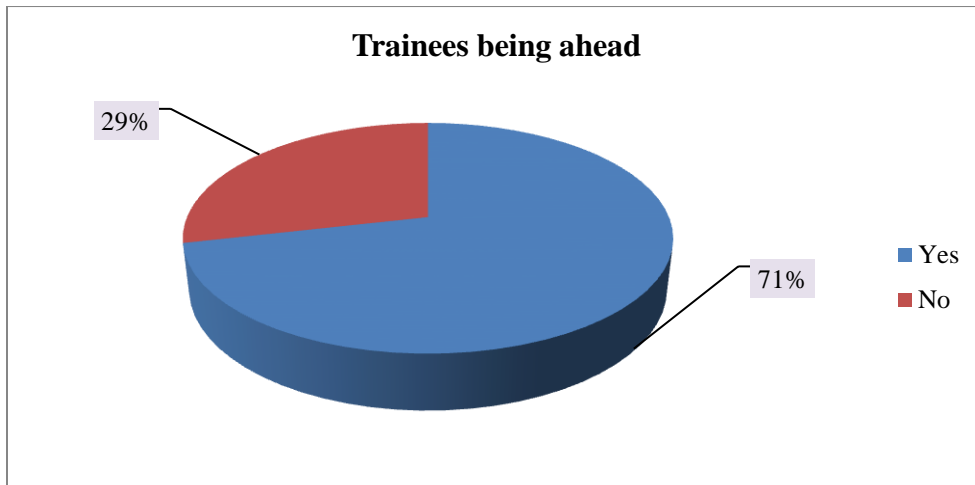


Figure 28: Trainees being ahead in some subjects

4.4.8 Distribution according to source of training materials

Internet and college notes were identified by 19.4% of the respondents to be the major source of training materials. This was followed by text books at 16.8% and colleagues at 16.1%. Both experience as a source of training materials and training manuals were at 14.2%.

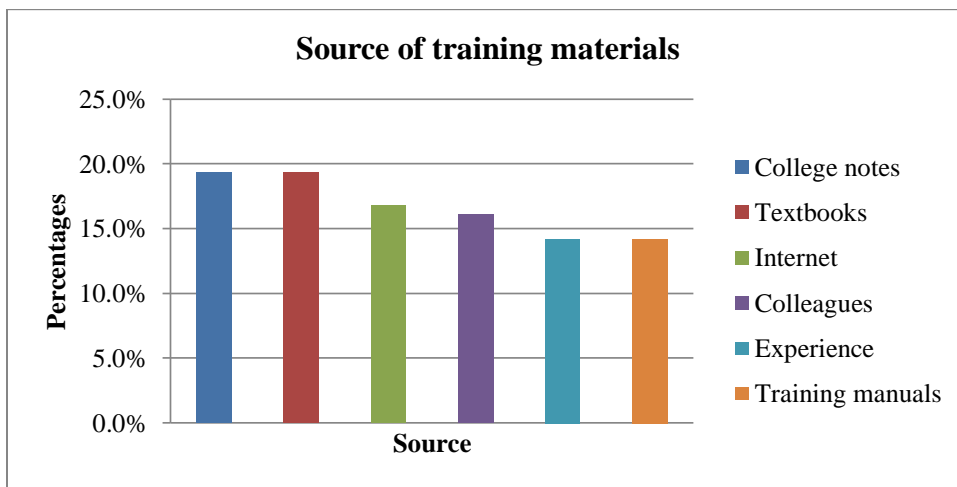


Figure 29: Source of training materials by staff

4.4.9 Distribution according to knowledge and use agricultural data base

67.9% of the respondents did not have knowledge on agricultural data base. Only 32.1% was aware of agricultural data base. In terms of use of the data base, the same picture was portrayed where 64.3% had not used agricultural data base while only 35.7% had used.

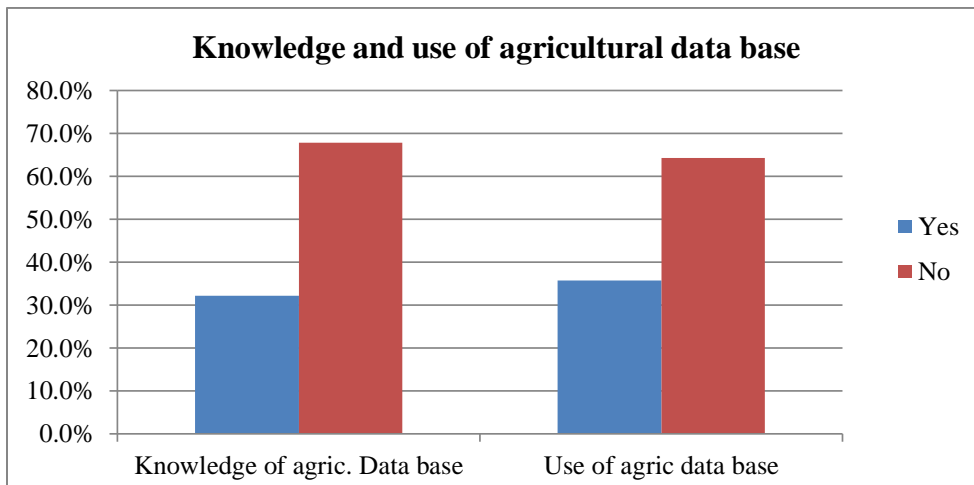


Figure 30: Knowledge and use of agricultural data

4.4.10 Distribution according to agricultural websites visited.

Both the Kenya Agricultural Research Institute (KARI) and Ministry of Agriculture (MOA) websites were the most visited as indicated by 33.3% of the respondents. This was followed by OARE at 25% while the least visited website was that one of IFRI.

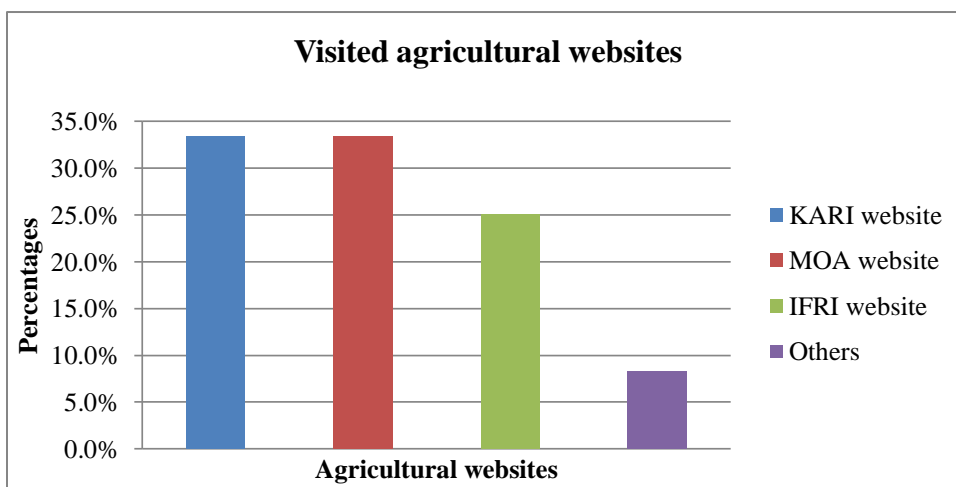


Figure 31: Agricultural website visited

4.4.11 Distribution according to presence of agricultural website

Two ATCs had websites represented by 20% while those with emails were at 96.2%.

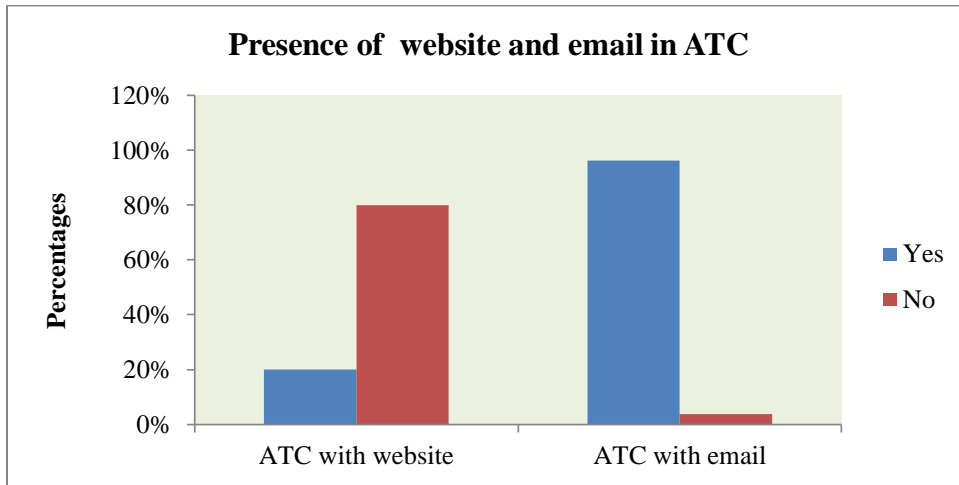


Figure 32: Presence of agriculture website

4.4.12 Distribution according to awareness of MOA website

72.7% of the respondents and 52.9% were aware of MOA website and email addresses respectively as shown in figure below.

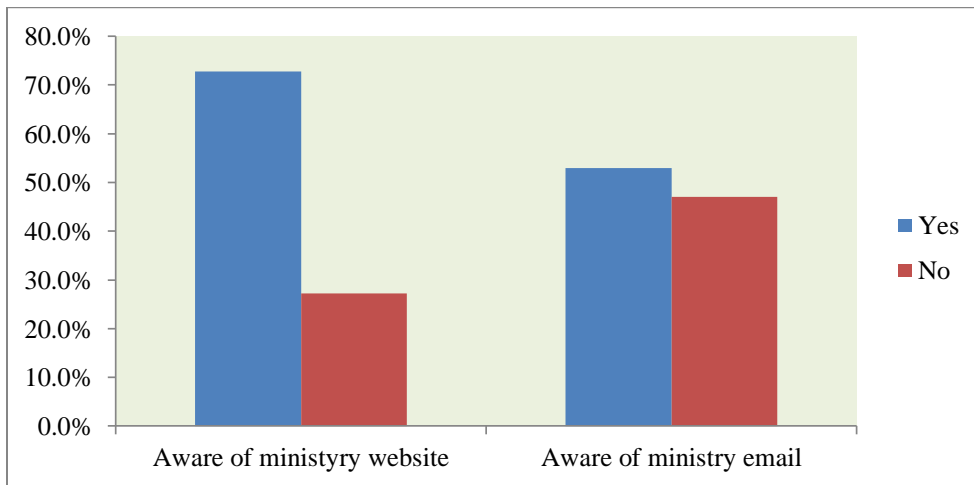


Figure 33: Awareness of MOA website

4.4.13 Ways of linking up

Other than the physical address, 26.9% linked up with the ATC through phone calls followed by 24.1% with SMS, email was the third at 17.6% of the respondents. The others were letter writing and reports at 15.7% and 13.0% respectively. The remaining 2.8% used other means like fax and linking with ATC through colleagues.

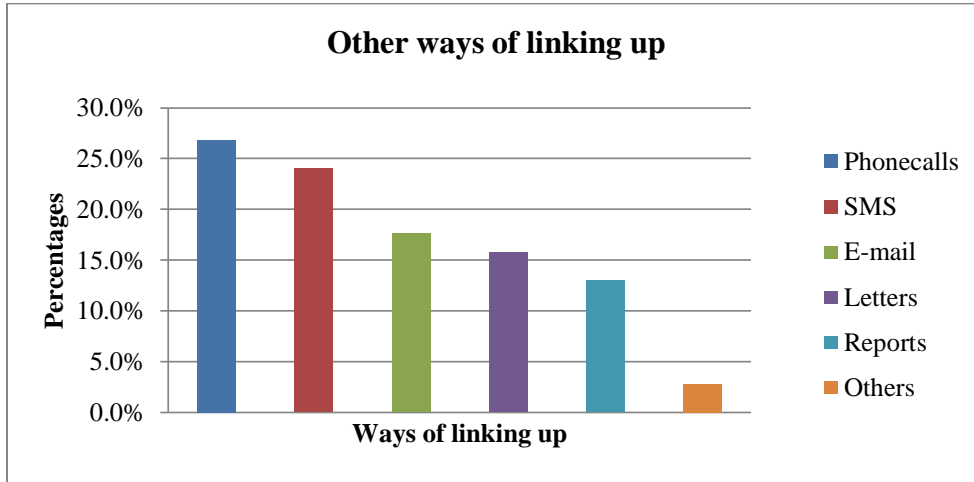


Figure 34: Other ways of linking up

4.4.14 Distribution according to uptake of ICT in ATCs

68% of the respondents admitted that there is a problem of uptake of ICTs in agricultural training as indicated in the figure below

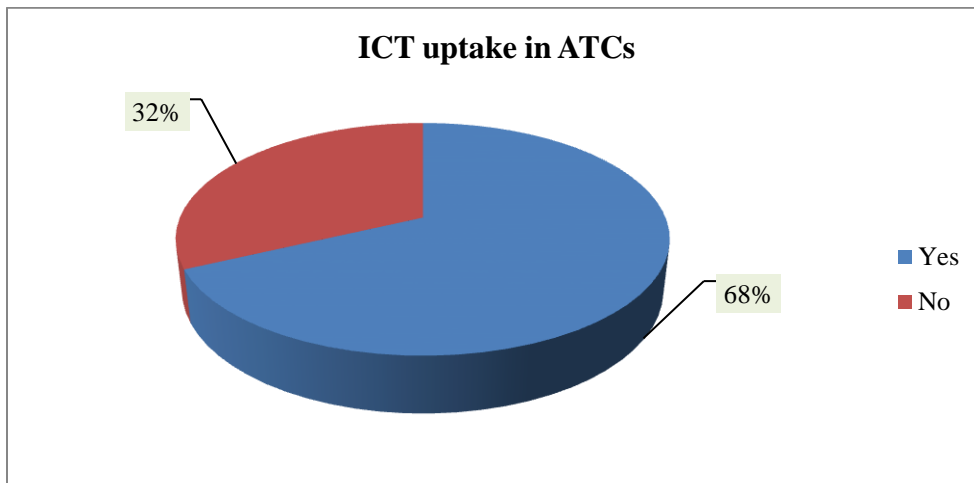


Figure 35: Uptake of ICTs in ATCs

4.4.15 Challenges of ICT in ATCs

Inadequate knowledge and skills and inadequate facilities were identified as the major challenges faced while using ICTs in the ATCs both at 28.4%. Closely was the inadequate internet availability and connectivity at 25.9% while the cost of internet provision was at 11.1% .least of the challenges was inadequate power.

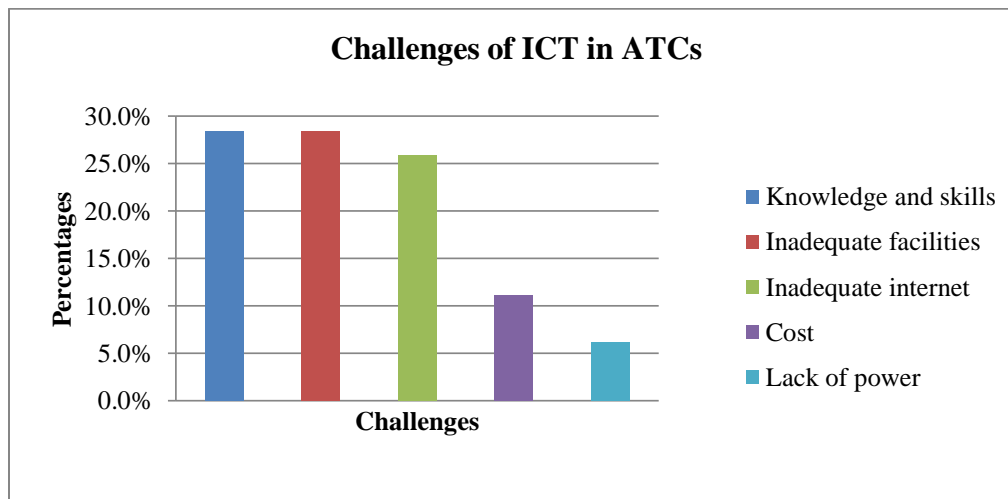


Figure 36: Challenges of ICT in ATCs

CHAPTER FIVE

DISCUSSION

5.1 Background Information

The data was collected from 40 respondents with majority of them being farm management and crops officers at 18.5%, followed by principals and deputy/training officers at 14.8% then livestock officers at 11.1%. The least number of respondents was at 7.4% and included home economics, agro processing and clerical officers. Only two respondents did not participate in the research as they were on duty assignments outside their stations. Majority of the staff in these ATCs especially the Principals, Deputies and Farm Managers are men with most of them being in the working age bracket of 36-50. A large number have attained a minimum of secondary level of education with diplomas. Those with bachelor's degree were at 18% with those with master's degree registering the least at 14%..

Staff in the ATCs is deployed according to their specialization and level of education. Principals and deputies have first and second degrees while the farm manager, crops, agro processing and livestock officers have diploma certificates all in agricultural related fields like Agriculture economics, agri-business, farm management, horticulture, home economics and agriculture engineering among others. The support staffs are certificate holders in their areas of specialization.

Results showed that staff understood what ICTs were as indicated by more than half of the staff (55.6%) being registered and active in the social media including Facebook, twitter and yahoo with Skype having very few users. This was a clear indication that the staff are able to utilize the available ICTs in one way or another at personal levels.

5.2 Availability of ICT facilities and services in the ATC

Information and Communication Technologies available at the ATCs include desk tops, printers ,laptops ,radio /TV sets , modems, wireless phones ,photocopiers , scanners ,office mobile phones and satellite dishes .Of these at least all ATCs had desktops, printers, laptops and modems and these constitute the mostly used ICT facilities in these institutions.

The computers in the ATCs are mainly in the main offices of the Principal and this is where most of the staff access them for their use with a few of the staff having the computers in their offices.

There is sharing of computers amongst staff with some accessing them from their colleagues' offices. Where computer labs and libraries are operational it shows that only 5% of the respondents access computers from these locations.

This means that computers from the main office are most at 43% and are easily accessible to staff at ATCs compared to computers from other locations for example in their own offices which is at 22%. The results from the respondents shows that majority of the computers are shared among the staff in the ratio 1:2 that is one computer assigned to two officers while in some fewer stations recorded a ratio of 1:5 that is one computer assigned to five officers.

5.3 Usage and utilization of ICTs

Most of the officers use computers for writing reports, internet services, music/videos, playing games and research among others the study shows.70% of ATCs have internet connections which enable officers to use it in browsing web, sending mails, chatting and visiting databases. It is also noted that the activities performed in those sites include sending mails, chatting, entertainment, downloading research among others and these are mostly done on daily basis. This is contrary to use of the same sites to access agricultural and educational databases and websites.Computers which are mostly desktops in these ATCs are used for writing reports. When on the internet most of the respondents are browsing to listen to music, watching movies and playing games. Use of the computers for research, data analysis and data storage is minimal.

5.4 Skills and competence possessed by staff

A large number of staff in the ATCs had undertaken a course in ICT represented by 82% of the respondents. The computer packages studied included introduction to computers, followed by PowerPoint, MS word, and Excel with the least numbers having taken a course in Outlook.

The respondents gave different information regarding their trainers on ICT. Most of the respondents 70.3% were trained by the tutors, followed by 10.8% who said that they learnt most of the packages by themselves since they had access to computers while the remaining got their training from friends and workmates.

Though many of the staffs are trained by tutors as indicated by the results only a few of them are excellent users with a rating of 15.8% and 40.2% for good. The fair ones were at 22.2% while the remaining 21.8% are poor.

It was noted that only a small number of staff had information about the existence of agricultural databases with only OARE (Online Access to Research in the Environment) being mentioned. Majority of the staff were aware of the agricultural websites with the most visited ones being Kenya Agricultural Research Institute (KARI), Ministry of Agriculture (MOA) and International Forestry Resources and Institutions (IFRI).

Only two ATCs in the central Kenya region have individual websites and the officers expressed their concern that ATCs are not allocated any webpage or space in the Ministries website making them unpopular among many of their potential customers and clients. Instead the ATCs operate email address which is basically used for communication purposes.

In linking up with the outside customer including other ATCs and training institutions, farmers and stakeholders the ATCs communicate through phone calls, SMS, E-mails, letters, reports among other means. The staff cited use of the above methods interchangeably for example use of SMS in place of letters for cost effectiveness.

5.5 Trainings using ICTs

The trainings offered in the ATCs that require ICTs include animal production, agro-processing, greenhouse technology, crop production and farm management. The trainings are offered by the specific officers as per their deployments in these fields and often use desktops computers, laptops, LCD projectors, photocopiers, printers and modems.

Training usually takes from 2 days to one week which comprise mostly of mixed gender of youth and women groups of which majority are young farmers within the age bracket of 20-40 years old .Another category of trainees comprise the school children who are below 20years including primary, secondary and college students who visit the ATCs for agricultural lessons as per their school curriculum.

According to study, 78% of the trainees have attained a secondary education which means that they can adequately understand training on most modern farming technologies in any ICT based presentations. The trainees represent a social group that is young and characterized by techno savvy lifestyle. Thus this summarizes why majority were ahead of their trainers in many topics. Most of them are able to check for updates on farming from the internet regularly on their mobile phones or in the cyber cafes.

On the contrary, internet use by the trainers ranks third in preference after college notes and text books with colleagues, experience and training manuals also taking a share in the note

references. The trainers only used the internet on a small scale for note references citing cost of internet and connectivity thus they preferred hard copies. On training materials many of the trainers prefer using flip charts and blackboards to using power point presentation as many of them face challenges of connecting the facilities.

5.6 Uptake of ICT in ATCs

Out of the total respondents 68% agree there has been a slow uptake of use of ICTs in the ATCs. The results indicate that the most available types of ICTs facilities are the desktops and the printers while laptops, though available are not sufficient. Most of these desktops and printers are located at the main office but the trainings are carried out in the conference halls meaning that the use of these facilities is restricted as they can be cumbersome to pot, disassemble and assemble whenever necessary. These issues regarding location of the ICT facilities have led to their low usage.

Staff lacks even the basic maintenance skills and installation techniques which often make them incapable of using the facilities even when they require simple fixings.

Inadequate skills and competences are also issues that are greatly contributing to the low uptake of ICTs use in the ATCs. Though most of the respondents have been trained on computer use they expressed their incapability of fluency in use of higher and sophisticated machines and programmes which have evolved since they were lastly trained. Most of the respondents do not know of any educational databases and very few have been visiting websites that can add on to their training knowledge not to mention majority have no idea of the existence of the Ministry's website.

Internet services in these ATCs registered low uptake and usage though all the respondents agreed that it was a key ingredient for their training knowledge sourcing if the Agricultural trainings in these institutions were to offer a competitive edge in the Education field in the country. However most of the respondents say they lack facilitation in terms of funds for airtime for crediting the modems which are the main internet access devices in most the ATCs. The cost of credit for the main communication providers the respondents say is too high even for those who would wish to sacrifice a little of their money. Due to the high cost of credit very little or no research for training purposes can be undertaken by the staff resulting to use of hand copy notes from colleagues, college and training manuals.

5.7 Challenges of ICT in ATCs

In the six ATCs there exist similar challenges on ICTS issues. Inadequate knowledge and skills amongst the staff is listed as the greatest. There are inadequate ICT facilities as depicted by the fact that the available facilities are shared to as much as in the ratio of one to five. For other facilities there is complete lack of for example the CCTV Satellite dishes.

Thirdly is the internet availability and connectivity. Availability is limited because the staffs use modems to access internet as the ATCs do not have centralized networking systems. This kind of access have a shorter bandwidth thus connectivity is much more interrupted affecting continuity and frequency of access.

Another challenge is the cost of internet services. Access to internet is expensive and has contributed to limited use in the ICT facilities in the workplace. The respondents the cost of airtime for modems as being far beyond their capability for it to be sufficient to enable them undertake substantive work for example researching on educational topics to train farmers or students.

Power or electricity infrastructure was least with some respondents expressing concerns of unreliability of the current power supply in terms of blackouts and inadequate connections in some of the buildings used by the staff as offices.

CHAPTER SIX

CONCLUSIONS AND RECOMENDATIONS

6.1 Conclusions

- i. The study concludes that there is a low uptake of use of ICTS in ATCs for trainings purposes because although the ICTs are available in the instructions it is established that they are located in areas that they are not readily available for trainings purposes as at times they have to be moved to trainings locations which is challenging for most staff.
- ii. The staffs in the ATCs are well trained on the introductory computer packages but they lack competence in use of most of the training packages. Refresher courses on ICTs use and sensitization on modern packages are a prerequisite for staff according to the research findings.
- iii. There is a notable use of the ICTs in the ATCs for other purposes rather than the core which is trainings with most staff showing tendencies to use internet mostly for entertainment for example music, games and movies which could be attribution to underexposure to knowledge on use of agricultural databases and websites with those using them being the principals and other staff who are pursuing further studies.

6.2 Recommendations

- i. The management of the ATCs should consider having the ICTs especially the desktop computers in the staff offices instead of in the main office or in the halls to encourage the staff to practice using them more.
- ii. The cost of credit for modems was cited expensive for most of the officers to afford thus the study recommend local internet networking to offer cheap connections of the ICTs within the institutions. This will enhance connectivity, increase bandwidth and improve frequency and reliability of internet.
- iii. Electricity infrastructure should be up scaled and installations done to cover all offices occupied by the staff and in the training halls to encourage more usage of these ICTs during trainings and for referencing of training materials

- iv. Refresher courses for staff in the ATCs especially those who handle trainings is required to equip them with the upcoming packages and basic maintenance of ICTs to enhance sustainability and interest in constant usage.
- v. The Ministry should sensitize the ATC staff on the existence and use of agricultural databases, agricultural websites, electronic journals and e books. This would improve the knowledge base of the staff trainers and avoid instances of farmers and stakeholders being ahead of the staff in knowledge during trainings

6.3 Future research directions

Future research should include or require a commitment to develop more sophisticated understanding of information and communication technologies requirements and usage in these institutions of learning as well as establishing ways of ensuring skill competences in the staff deployed to offer trainings. There is also need for in-depth qualitative research to provide further insight in the diversities of ICTs uncovered by this and other previous surveys.

In short term the focus should be on the impact of use of computers and internet technologies and their capacity to make communication of agricultural information easier and efficient sustainably. More generally the trend towards greater online connectivity through new services will continue and so pose further question for research about digital divide and digital inclusiveness across these and other institutions of learning.

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APPENDICES

Appendix I: Sample questionnaire

I am Dorothy Mwaniki, a Master's of Science in Agricultural Information and Communication Management (AICM) Student at the University of Nairobi.

I am currently undertaking a research on an assessment of effective use of information communication technologies in agricultural training centers in Central Kenya.

You have been selected as a respondent to participate in this study; your participation and co-operation are important and will be highly appreciated. The information collected from you will be kept highly confidential and will only be used for the mentioned research work.

As a respondent you are free to ask for any clarifications and to raise any concerns at any point during the process.

Date:/...../2013

(For the researcher)

Serial Number:

--	--	--

Name of the institution.....

County

Sub county.....

A) Personal Information

i) Name of respondent (optional).....

ii) Gender

Male	Female
1	2

iii) Age

18-35	36-50	51-60
1	2	3

iv) Level of education (tick for the highest level achieved)

Doctorate degree	1
Master's degree	2
Bachelor degree	3
Diploma	4
A Level	5
O Level	6
Primary Level	7

v) What is your area of training (indicate below)

.....

vi) Indicate your current deployment

.....

vii) (a) Are you registered in any social media?

Yes	No
1	2

(b) If yes, which one? (Indicate in the boxes provided below)

1	
2	
3	
4	
5	

B) ICT facilities

viii) In the table below indicate the ICT facilities/services available in your ATC Station and give a breakdown on their numbers?

No.	ICT facility	Tick for each available	How many?
1	Desk top computers		
2	Laptop computers		
3	Modems		
4	Printers		
5	CCTV		
6	Mobile telephone		
7	Scanners		
8	Wireless telephone		
9	Photocopiers		
10	TV/Radio Sets		
11	Internet /Email connections		
12	Satellite discs		
13	LCD Projectors		

ix) Which ICT facilities are you able to use comfortably in your place of work? (Rank 1-12)

No.	ICT facility	Your Ranking
1	Desk top computers	
2	Laptop computers	
3	Modems	
4	Printers	
5	CCTV	
6	Mobile telephone	
7	Scanners	
8	Wireless telephone	
9	Photocopiers	
10	TV/Radio Sets	
11	Internet /Email connections	
12	Satellite dishes	
13	LCD Projectors	

C) Level of ICT Skills

- x) What do you understand by the term ICT?
-
- xi) Have you taken a course in ICT?

Yes	No
1	2

- xii) If yes, use the table below to indicate which applications you trained on (column 3) and who trained you (column 4)?

Use the following keys to fill in the table (1=myself, 2=tutor, 3=friends, 4=family, 5=other workmates 6=online course, 7=ministry, 8=other specify)

No.	Application	Tick for each trained	Who trained you
1	Introduction to Computers		
2	Information Technology		
3	MS Word		
4	MS Dos		
5	MS Excel		
6	MS Access		
7	MS PowerPoint		
8	MS Outlook		
9	Desktop Publisher		
10	Email/Internet		
11	Data analysis Packages (SPSS, GENSTAT, SAS, etc.)		

- xiii) How do you rate your level of competence in using the packages you indicated above? (Tick as appropriate)

1	Computer package	Excellent	Good	Fair	Poor (no capability to use)
2	Introduction to Computers	1	2	3	4
3	Information Technology	1	2	3	4
4	Ms Word	1	2	3	4
5	MS Excel	1	2	3	4
6	MS Access	1	2	3	4
7	MS PowerPoint	1	2	3	4
8	MS Outlook	1	2	3	4
9	Desktop Publisher	1	2	3	4
10	Email/Internet	1	2	3	4
11	Data analysis Packages (SPSS, GENSTAT, SAS, etc.)	1	2	3	4

xiv) Where do you use computers in you workplace? (Tick all that apply).

	Location	Tick
1	Main office	
2	Library	
3	Conference hall	
4	Computer lab	
5	Own office	
6	Colleague Office	
7	Any other(specify)	

xv) In the area of using computers you have indicated above how are they shared?(tick that apply for the ratio indicated).Computer : Officer ratio

Ratio of computer sharing at work place					
≤1	1:1	1:2	1:3	1:4	≥5

xvi) Indicate from the list provided the activities you commonly perform using the computers? Tick all that apply.

	Activity	Tick
1	Find and research information	
2	Surf internet	
3	Write reports	
4	Play games	
5	Play music /videos	
7	Any other(specify)	

xvii) Does the Agricultural Training Centre have internet services?

Yes	No
1	2

xviii) Are the internet services in the ATC available for your use?

Yes	No
1	2

xix) If yes, whenever on the internet, what are your frequent sites?

Mail services	1
Websites	2

Databases	3
Chatting sites	4
Other (Specify)	5

xx) In a ranking scale of 1-6, which of the following do you perform quite often with the internet? Please rank the options 1-6.

No.	Activity	Rank
1	Research work	
2	Sending mails	
3	Chatting	
4	Entertainment	
5	Downloading programs	
6	Others specify	

xxi) Please indicate in the table below how often you have accessed these sites while performing the activities listed below? (Tick as appropriate):

	Daily	Weekly	Monthly	Quarterly	Yearly	Never
Research work						
Sending mails						
Chatting						
Entertainment						
Downloading programs						
Others specify						

D) ATC Trainings

xxii) Which types of trainings are offered at the ATC that require use of ICTs?(list at least five in order from the most conducted to the least)

1.	
2.	
3.	
4.	
5.	

xxiii) Indicate the types of ICTs frequently used during these trainings and for each indicate its purpose?

	Type of ICT	Purpose
1		
2		
3		
4		
5		

xxiv) What duration are these trainings scheduled scheduled(tick)

1day	1
2 days	2
3 days	3
1 week	4
More than a month	5

xxv) Who are your frequent customers for these trainings?

Youth groups	1
Women groups	2
School children	3
Mixed gender groups	4
Any other(specify)	5

xxvi) What is the age bracket of most of the trainees

below 20 years	1
20-40 years	2
40-60 years	3
above 60years	4

xxvii) What is their average level of education

No formal education	1
Primary	2
Secondary	3
Degree and above	4

xxviii) Do you have cases where the trainees are ahead of you in information regarding certain topics?

Yes	No
1	2

xxix) What is the source of your training materials (rank in terms of the order of your preference? Use (1-6)

Internet	Rank
College notes	
Text books	
Colleagues	
Experience	
Training manuals/booklets/brochures	
Other (Specify)	

xxx) (a) Do you know any Agricultural Databases?

Yes	No
1	2

(b) If yes mention at least two that you know

.....

xxxi) Have you ever used any agricultural website to obtain your training materials?

Yes	No
1	2

(a) If yes, mention at least two that you have used

.....

(c) If no, why?

.....

xxxii) Does the ATC have its own website and e mail and what are the addresses?

Website		Domain/Url/Address	E mail		Address
Yes	No		Yes	No	
1	2		1	2	

xxxiii) Are you aware of the Ministry Headquarters website and email?

Website		Domain/Url/Address	E mail		Address
Yes	No		Yes	No	
1	2		1	2	

xxxiv) Except for the physical visits to the ATC by the farmers or stakeholders how else would they link up with other centers for say feedback, references or follow ups?

Emails	1
Letters	2
Reports	3
Phone calls	4
SMS	5
Others specify	6

xxxv) (a) Do you think there is a problem with the uptake of ICTs in Agriculture training?

Yes	No
1	2

(b) Explain briefly)

.....

xxxvi) Give at least five challenges of using ICTs in the ATC and suggest recommendations?

	Challenges	Recommendations
1		
2		
3		
4		
5		

Thank you for your cooperation.