



REPORT ON THE ROLE OF ICT IN SOLVING ENVIRONMENTAL AND SOCIO-ECONOMIC CHALLENGES IN TANZANIA.

THE CASE OF ARUSHA AND MANYARA REGIONS

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Abstract

The study on Information and Communication Technology was conducted to determine the availability and effectiveness of ICT resources that aims at solving people's environmental and socio-economic challenges in the selected regions of Arusha and Manyara. About six hundred (600) people were involved in this study and they participated in a number of ways including interviews, focus group discussions and questionnaires. It was found that Government initiatives on ICT in the country has reached to the level of district and council offices only and that lower government levels (division, wards, villages) were totally denied access to information through ICT. Moreover, the available resources which are all not in local content were only used to easy various activities taking place in the councils and not for dissemination of information in the aspects of health, agriculture, education, environment, livestock keeping or business.

The study found also that many people in the local communities were eager and ready to learn and use the ICT resources for their daily activities if they are given access to them despite presence of very few ICT solutions implemented in their communities. Of all respondents reached, 85% of them had at least used any of the ICT resource and mostly more than 90% of them owned and used mobile phone, radio or television mostly for communication.

It was also found out that about 95% of the respondents had never used any of the ICT resource for getting real time information in aspects of health, education, agriculture or environment other than voice calls, texting and mobile money services. The study concludes that ICT is the drive force for development of Tanzania in all aspects of socio-economic challenges. These ICT applications and resources have to align with the nature, needs, financial capabilities, infrastructure and abilities of all users in the country.

The authors recommend that in order for ICT to help the country of Tanzania in achieving its development vision 2025, solutions suggested in this report should be supported and expanded to all regions in the country. This will help people to have access to real time information and fast service delivery in their daily lives and thus total transformation of the country to e-Tanzania.

Key words: *Information and Communication technology, Arusha, Manyara, availability, effectiveness, Tanzania, e-Tanzania*

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Copyright acknowledgement

We acknowledge that the copyright of this report belongs to AFRINIC and Arusha Technical College.

List of Acronyms and Abbreviations

ATC	Arusha Technical College
COSTECH	Tanzania Commission for Science and Technology
CWT	Community Walk through
DAS	District Administrative Officer
DED	District Education Officer
FGD	Focus Group Interviews
IDI	In-depth Interview
ITU	International Telecommunication Union
LGA	Local Government Authority
MIS	Management Information System
NACTE	National Accreditation for Technical Education
NGO	Non-Governmental Organizations
NIDA	National Identity Authority
NIS	National Innovation System
NTA	National Technical Awards
PO-PSM	Prime Minister's Office- Public Services Management
REA	Rural Energy Agency
TCA	Technical College Arusha
TCRA	Tanzania Communication Regulatory Authority
UNESCO	United Nations Education
VEO	Village Executive Officer
VETA	Vocational Education and Training Authority
WEO	Ward Executive Officer

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CHAPTER ONE:

1.0 Introduction

Information and Communication technology is among the fastest improvements in Tanzania despite the challenges combating its move. Currently the government with its intention to bridge the ICT gap and the need to meet its development vision 2025 has managed to implement the national communication infrastructure backbone network in almost 19 regions and covered 59 districts. The President of Tanzania insisted on May 2012 that “...we have so far connected a lot of districts with FOC project and we expect to cover the remaining eleven (11) regions by the end of this year and the remaining districts by June 2013”. Completion of the ICT infrastructure backbone project will ensure connectivity from the village level with ICT to the cities. Also the community access points were expected to be established in the colleges, universities, secondary and primary schools. Research centers, post offices, hospitals, local government departments as well as central government were connected. On the same month, 2012 the President launched the “Tanzania Beyond Tomorrow” programme aiming at rolling-out computer based teaching programme in public schools and is expected to cover about 4000 secondary schools in Tanzania. That program was supported by international organizations and the ministry of education to carter the demands. Moreover, the Ministry of Communication, Science and Technology facilitated the establishment of multipurpose tele-centres in the country since 1999. Currently this Ministry in collaboration with Tanzania Communications Regulatory Authority (TCRA), Tanzania Commission for Science and Technology (COSTECH), International Telecommunication Union (ITU), Non-Governmental Organizations (NGOs), and other public and private organizations managed to introduce a number of tele-centres in various regions. They are operating under non-governmental organizations and other development partners. Also in 2007, the ministry of science, communication and technology established the National Innovation Systems (NIS) under UNESCO support. Its implementation aimed at ensuring sustainable growth and improving living conditions to most of the people in the country. The main question one may need to get answers from, is how far all these initiatives brought relief to the people of Tanzania in the aspect socio-economic development?

1.1 Outstanding Achievements reached by Tanzanian government:

The government has managed to install a Government broadband network backbone (national communication infrastructure backbone network) as well as Government Network Management Centre that has been built at the Prime minister's Office, Public services management (PO-PSM). The Centre was expected to be hosting the hub of Government's secure network for voice and data communications, software and security measures as well as spearheading coordination within Government. Moreover; Management Information Systems (MIS) units have been established in most Local Government Authorities (LGAs), district authorities and all Regional Secretariats to provide the first level of ICT support services. Sensitizing ICT and provision of training is done as a continuous process that targets public servants and other stakeholders; Establishment of National Identity Authority (NIDA) is another successful achievement reached by the country as well as installation of various cross-cutting systems. All these have enabled the government to perform more efficiently; effectively and reliably to meet its intended goals.

1.2. About Arusha Technical College

Arusha Technical College (ATC) was established in 1978 jointly by the Governments of the United Republic of Tanzania and Germany, under the name of the Technical College Arusha (TCA). The College is located at the Central Business District of the Arusha City which is the Northern Tanzania's center of agriculture, commerce, trade and tourism. Arusha City is also the Head Quarter of the East Africa Community and is the central point in Africa between Cape Town and Cairo. All these make the location of the College an ideal place for education, training and applied research.

The College is accredited by the National Council for Technical Education (NACTE) and Vocation Education and Training Awards (VETA) to run and grant awards to successful candidates in technician and Engineering programmes. Awards offered are Ordinary Diploma namely the National Technical Award (NTA) level 4 – 6 and the Bachelor of Engineering namely the National Technical Award (NTA) level 7 - 8.

1.3 ICT Situation Analysis of the selected Regions

Arusha and Manyara regions with 86,108 km² consist of thirteen (13) districts including Arusha city council, Arusha District council, karatu district, Meru district, Babati district, Babati rural district, Hanang district, Monduli district, Ngorongoro District, Longido District Council, Mbulu District, Simanjiro District and Kiteto District.

These regions consist of a population of over three million and five hundred (3,500,000) people. Most of its people live in the rural areas and conduct number of activities including agriculture, business, animal husbandry, fishing and tourism.

Despite the efforts made by the Government on ICT initiatives to its people, yet the selected regions has been facing a number of challenges including lack of access to information on agriculture, health, education, business and environment.

All these challenges necessitated the project team to conduct the research subject to the information that was available at hand on the Government initiatives that has been done so far.

1.4 Purpose and Scope of the project

The main purpose of the project was to find out how far are the ICT resources available in the communities, their contents, types, availability and effectiveness in meeting demands of the low income people both in Arusha and Manyara regions. The research outcomes helped the project team to come up with the ICT solutions that would have positive impact to the community members. Among them were to establish, deploy and suggest to the government and other development partners on the following:

Firstly; deployments of new ICT applications like mobile application and community website¹ and social media² for the betterment of the community and the local Government Authorities,

Secondly; provision of ICT awareness to secondary school teachers and local community leaders, who can impact ICT knowledge to the students and community members,

Thirdly; support in the establishment of local ICT training centers/ kiosks that can enable community members to attain ICT knowledge and have access to real time information,

Fourthly; provision of information to the government, project funder and other development partners on real situation of local communities and the need to provide affordable means of communication and energy (solar power, wind turbines and hydro turbines) and best ways to improve current ICT resources and applications for the local communities.

¹ See www.habarikatz.org

² See <https://www.youtube.com/watch?v=8-8UN3dw4X8>

1.5 Motivation from Arusha Technical College

Arusha Technical College (ATC) motivates its employees and academicians at large to fully engage in training, community services and research activities as part and parcel of their normal routines. Subject to that, the College motivated the project team in this research on the following:

- Provision of conference venue and ICT facilities in training and conducting workshops for this project,
- Support in providing short course training to secondary school teachers and community centers trainers and on provision of soft and hard copy teaching materials that can easily be used to train students and community members on ICT basics.
- Support of transport to conduct the research for the two regions of which the funds had to be used to make car service and purchase of fuel only for the whole research period. Also provisions of teaching aids (e.g. flip charts, projector, and laptop computers) in various activities of this project.
- The College also supported the team members in maintenance of computers available in those secondary schools and community centers.
- Lastly, the College also supported the project team on transport and accommodation during project pilot study in the two districts.

1.6 Users and uses

1.6.1 Users of the findings

The findings of the project will help the following users:

- The government authorities (decision makers),
- Local government authorities (from District to Village Levels)
- Project funders,
- Research partners,
- Community members,
- Private institutions, colleges and universities

1.6.2 Uses of the findings

The findings will also be used as follows:

- To educate the community members and students.
- To provision of real time information on health, environment, agriculture, livestock keeping, business, education, entertainment through created website and mobile technology applications.
- To other researchers on the improvement and/or service provision to the community and the country at large as well as establishment of other research studies related to ICT.
- To other development partners and the government to come up with various ICT strategies and solutions that focus local community members especially women and people with disabilities.

1.7 Communication strategies

The project team will use a number of communication strategies including:

- Seminars, workshops, training provision and publications to all stakeholders,
- Use of local leaders trained on how suggested ICT applications are used
- Sharing information with the social media where most of them have already been shared through the established website (www.habarikatz.org), community social Media including, face book pages³, YouTube⁴, flickr⁵ and linkedIn.

1.8 Project objectives

The project consisted of the following objectives intended to be achieved:

- Identifying the development, deployment and enhancement of network infrastructure, devices and contents to support information dissemination;
- Understanding the applications used and solutions taken towards supporting information dissemination

³ See https://www.facebook.com/pbkaaya/media_set?set=a.10203365248282119.1073741826.1538693229&type=3

⁴ see <http://youtu.be/8-8UN3dw4X8>

⁵ See http://www.flickr.com/photos/fire_project_tanzania/

- Carrying out field-based activities that will provide information on the availability and effectiveness of ICT in resolving environmental and social-economic challenges in Arusha and Manyara regions.
- Preparing project report to be shared and discussed with several stakeholders (Community members, Local authorities, Government, International Organizations)

1.9 Project Conceptual framework

Despite government initiatives in improving various ICT facilities and skills in the community, yet there are a number of factor which hinder the efforts from within the community. The limiting factors will only be resolved by increasing awareness and readiness to community members especially the low income people and the ICT illiterate people in identifying the opportunities within available ICT facilities and skills. This will lay a foundation for expertise and development of ICT culture in the community as elaborated in the project’s conceptual framework below:

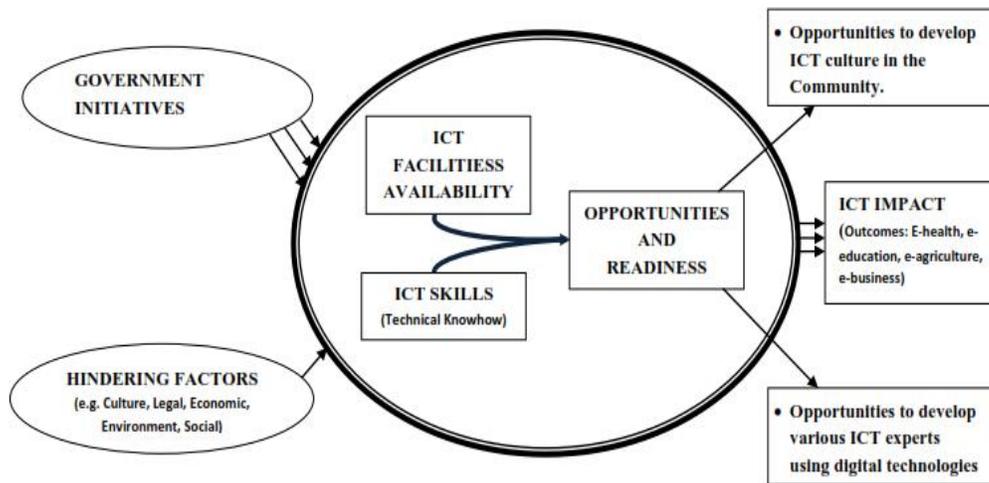


Figure 1: Project Conceptual framework

CHAPTER TWO: LITERATURE REVIEW

2.1 Project justification:

The project intended to look on the availability and effectiveness of ICT in resolving environmental and social- economic challenges in Tanzania. The word e-development as it is pronounced can sound as the use of internet in facilitating development, increase people's opportunities, empowerment of poor people and respond to various insecurities and vulnerabilities.

Others may see it in the aspect of development through the use ICT but generally speaking it can be referred to as development expected to be supportive, well organized, and reliable in nature. Hanna (2007) sees e-development as a guideline to various policies, investments and mechanisms on how ICT can be developed and used to meet development objectives of the country. He further emphasized on the actions and resources of stakeholders being focused on the major ICT priorities of the national development. Thus the use and application of ICT in any country like Tanzania can easily foster innovation, transformation of the economy, growth of country's production as well as improvement of living standard to its people.

A country like Sri Lanka has implemented e-development initiatives since 2005 supported by the World Bank and has attained many achievements in terms of poverty reduction and improving the well-being of its people. There are a number of available ICT and development policies in Tanzania like National ICT policy (2003), national science and technology policy (1999), national strategy for growth and reduction of poverty (2005) and Tanzania development vision 2025 of 1998. All these policies intend to ensure a well learned and educated society to the Tanzanians. This is further highlighted by the International Telecommunication Union (ITU) in its World Telecommunications Development Report of 2002 that in the last few decades many countries have improved their telecommunication sectors proving that country's particular trend of policies has been much successful. They further elaborate that "... *this implies that using absolute scores and absolute growth rates, nearly every country would register a gain in telecommunications infrastructure.*"

The country intends to support itself in the attainment of creativity, innovativeness and quality education so as to respond to the challenges facing effective development both nationally and internationally. Thus ICT is among the major driving force to the realization of Tanzania Development vision 2025.

The Government ensures the reliability of ICT infrastructure, high-speed and countrywide coverage is developed by encouraging multi-sectoral initiatives. Moreover, encouraging the use of ICT on poverty reduction, employment creation, and innovative entrepreneurship which will in turn increase the size and quality of ICT-skilled human resource base in the country.

The government believes with the use of ICT, quality of delivery of education and training will be improved in all areas including distance learning. Also, ICT will help in expanding and improving adult-education, life-long learning and both general and digital literacy programmes, notably for retraining and re-skilling the existing workforce.

The government also ensures development and deployment of nationwide e-Education system that support schools and higher education/training facilities across the country by interconnecting them with each other and with relevant knowledge centers while also generating information to better shape policies, strategic plans and tactical decisions for developing education and vocational training in Tanzania.

The vision 2025, intends to give special attention to provide new learning and ICT access opportunities for women and youth, the disabled and disadvantaged, particularly disenfranchised and illiterate people, so as to tackle social inequities.

The Tanzania Development vision 2025 also intends to encourage and support ICT training for political decision-makers, community and civil society leaders, as well as private and public sector executives; to develop and deploy a nationwide ICT system to support farmers, traders and extension workers in remote areas; to develop and deploy a nationwide e-Health system that will support medical facilities in the under-served areas as well as developing a nationwide e-Tourism system.

2.2 Motivation

The main driving force towards e-development was to find out to what extent is ICT available in the country and its effectiveness in socio economic aspects like health, education, environment, business, income generation, community participation and effective governance. We have been motivated to work on this project for a number of reasons. Among them include a need to facilitate change and support development initiatives by the use of ICT. Moreover; to support the ATC's achievements for introducing the ICT department to deal with training, research and consultancy services inside and outside the college.

Thus participating in this project has helped the team to achieve intended colleges' objectives. Team capability on participating on the project has also been another motivating factor due to its professional

diversification. The team members have wide knowledge in the aspects of programming, system analysis and design, software development, database development and management, research methodologies and analysis as well as website design. Moreover, a need to enter in the field of researchers was another motivating factor.

Most of the ICT researchers are coming mainly from South Africa, Botswana and Nigeria totaling only 9% of the researches done in Africa by African institutions. This shows that there is a very low level of formal research outputs done by African authors especially in the ICT for development for almost more than two decades (Gitau et al, 2010).

Government initiatives on ensuring effective ICT application and utilization in development has motivated the team to find out to what extent are the ICT developments available, how they are being developed, used and maintained. A need to understand how those available systems help the poor in resolving their problems and helping them in their daily activities was another issue needed to be addressed by the team.

The team was eager to find out how far the network infrastructure has been implemented by the government and to what extent it has been used. Lastly, with rapid change of technology, the team was eager to find out the available devices that are used by most of the people in making sure that information is widely broadcasted, understood and well applied for development.

2.3 Innovation

This project is unique as it has helped the team to understand the available ICT resources for development initiatives and how they have been used to cater people community members' needs in the country.

Moreover, the project has helped the team to identify how ICT is used in addressing challenges facing development to both urban and rural population. Despite engaging in other developmental projects in the country, this project was different in the sense that it helped in understanding how poor people in the countryside are capable of and committed in using ICT for their development.

The project has also helped the project team to understand how government and private institutions determine what has been achieved by ICT in Tanzania and therefore wide chance to identify the gaps that need improvement in areas where the use and application of ICT has taken place.

Many ICT companies and organizations in the country put much of their efforts on making profit and do not consider what users really need especially in designing applications expected to meet user demands.

This study further helped the team to come up with preliminary ideas on what is best for the majority of Tanzanians to cater development needs rather than investing much on the applications that do not resolve their problems. This is further highlighted by Mbarika and Meso (2008) “...Hence, many business owners and policy makers in Africa have fallen to the grave error of acquiring new “high-tech” technologies for the sake of keeping up with the “West” without addressing the questions: “Which specific technologies do we need?” and “What do we need these technologies for?” .

Moreover, the project has helped the team to understand the challenges encountered by the government and private sectors in implementing ICT in service delivery.

2.4 Project Impact

This project has helped a lot the project team to think of the best ICT solutions that can easily be applied to all community members despite of their education levels, economic activity, financial status, gender, disability, life style and/or even their geographical locations. The team believed that outputs of the project will have positive impact to the community members through implementation of the suggested solutions. Among the solutions include; provision of ICT training to the secondary school teachers and establishment of mobile technology application. These will enable people to get real time information regarding their economic activities specifically in agriculture subject to the available types of crops grown in their areas, market information, type of fertilizer to be used and product prices in various markets within the regions. This is due to the fact that, more than 70% of respondents were able to access easily mobiles for communication as an ICT resource. Thus a need to utilize mobile phones in a broader way apart from messaging and calling as experienced by many users.

This is further supported by the research study by Tanzania Communication Regulatory Authority (TCRA) “...It is forecasted that by 2016 there were about 38 million mobile subscribers in Tanzania, reflecting a penetration rate of 70% also internet and broadband penetration will reach 29% and 3.3% respectively due to increasing access to wireless technologies.”(Mutuku, 2012)

The Arusha Technical College on implementation of these applications has shown high participation. This is not only in supporting the academicians on research activities but also on supporting the communities in resolving their environmental and socio-economic challenges.

The College has also learned the best means of resolving community problems by establishment of simple technology equipments that can easily be used by any community member despite of their

education background and technical know-how like incubators, solar powers and turbines for generating electricity in areas with no electricity.

The deployment of the suggested ICT applications and capacity building will have a lot of positive impact as many people don't have means to access information on socio-economic aspects especially agriculture especially in the rural areas. This situation was realized during the data collection as a number of people commented on failing to make right decision on the type of crop to be grown due to lack of right seed selection information and that they just go to the shops and purchase the seeds which are available in the shops.

The team believes that the implementation mobile application which is now in operation will narrow down challenges faced by community members.

Furthermore, the project team and the ATC believe that the implementation of suggested solutions and applications will have positive impact to all. Hence a number of ICT teachers and computer trainers in the community will increase, number of repaired and maintained ICT facilities and applications will increase, ICT knowledge in the community will be high as well as use and application of ICT in socio-economic aspects like business, business, education, health, agriculture and communication interaction will increase tremendously.

2.4.1 Contribution of the project to development

With the Government's need to meet its development vision 2025 and on its move to implement the national communication infrastructure backbone network that has not yet covered reached all places in the country, this project supports the government's ICT initiative to the development.

The project team believes that, implementation and effective use of the suggested improvements and solutions to the available ICT resources and newly deployed ones will have a lot of impact to the development at large in bringing relief to the people of Tanzania in the aspect socio-economic development. This is because, people will have a wide access to real time information, ability to get market information, product prices in various local markets within the country, access to seed types to be grown subject to soil type and season of the area, fertilizer to be used.

As one of respondent commented "*...having ICT facilities and resources will help us to do things better since they show a determination of development. And if we will be plugged into the world, especially in the coming years, on our continent of Africa and..., we necessarily must be part and parcel of the information age*".

Also access to other relevant information regarding education, health, environment and livestock keeping will highly be contributed by the projects' findings and outputs.

Moreover, the project will help the Ministry of Science and Technology and other development partners to establish more multipurpose tele-centres especially in Arusha and Manyara where the project team found very few tele-centers.

It is through this use of ICT that will serve the needs of the poorest and vulnerable populations in the Country. This is because, these people represent a widespread and relatively low cost communication option for rapid transfer of information and facilitation of service that will eliminate prevalent issues of distance and/or time.

2.4.2 Support of the project in building up the research capacity of ATC

This project has contributed a lot to bridging the research gap to the people involved in the project. This is due to the fact that, most of them had no experience at all on research activities, how they are conducted, the tools used, how to prepare them and their application in the field. Furthermore, the project helped the people involved to understand the real prevailing situation in the country specifically the selected regions of which without this project they could not know the reality rather than basing on the documentation and what is portrayed by the government officials and politicians.

CHAPTER THREE: RESEARCH METHODOLOGIES

Introduction

This chapter intends to focus on the methodologies that were used during the project. It consists of the following sections: research approach and methods, pilot testing, sampling design, data collection methods, data collection period, data analysis, research ethics and challenges faced during conduct of the study.

3.1 Research approach and methods

The project team used both quantitative and qualitative methods to seek out for information from the six hundred (600) respondents on the availability and effectiveness of ICT in solving environmental and socio-economic challenges in Tanzania. Qualitative methods were used to get various details of the requirements for the implementation of ICT in the selected regions. These methods helped the project team to understand what most of the community members know and use with regards to the ICT inventions and innovations.

On the other side, quantitative methods were also used (questionnaires, interviews, group discussions, observation). The aim was to help the project team to follow clearly the research objectives, answering the research questions as well as arriving at a good conclusion and solution implementation that would meet demands of the community members. Research approaches and methods used in this study are further elaborated in the below graph.

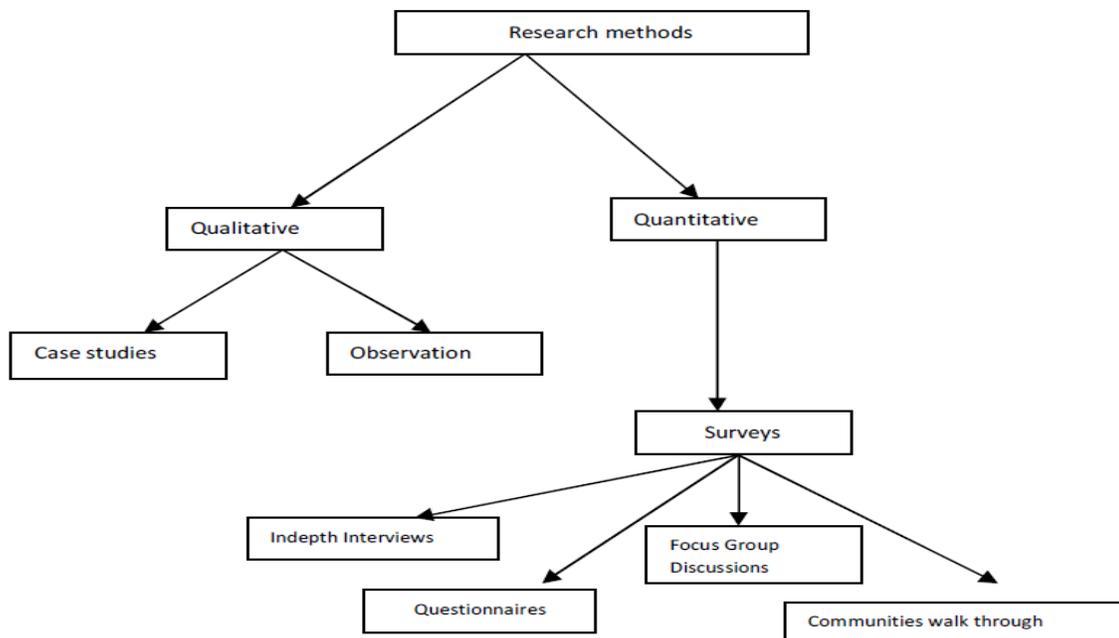


Figure 2: Research methods used

(Source: Author)

3.2 Pilot Testing

Bennekom (2002) outlines the main intentions of conducting pilot testing. Among them include helping the project team to identify the mistakes or any unclear questions that would affect the quality of the questionnaires. Bennekom (2002) also alerts that it was possible for the respondents to do mistakes in answering the questionnaires. They could be difficult to be identified by the project team because the respondents would approach the questions in their own perspectives.

By the use of pilot study for the research questionnaires, the project team was able to check if questions were understood by respondents as well as if the questions were in order.

Simon (2011) elaborated that doing pilot study has a number of advantages including giving earlier alert on the weaknesses in the proposed study. Also most of the studies that are pilot tested helps in avoiding inappropriate, misleading as well as redundant questions.

Furthermore, Saunders (2007) highlighted on advantages of using pilot study helps to approximate time to be given to complete a questionnaire successful. It further helped to ensure clarity of the questions and that respondents are able to answer all the questions. The project team initiated meetings with targeted groups through their Village Executive Officers (VEO) and Ward Executive Officers (WEO) in the selected pilot area. The main purpose was to identify current ICT facilities available in the pilot area, to identify available ICT applications as well as to identifying user capabilities on ICT applications.

Moreover, the team wanted to get experience on the time to be used for each data collection method, to identify type of answers subject to participants understanding of the questions and needs of the questions and to identify challenges encountered in the data collection process.

The pilot study helped the research team to rephrase all questions in a more understandable way and got the real picture of the nature and character of people to be interviewed.

3.3 Sampling design:

A sample refers to a compartment of a larger population of objects like individuals, businesses, households and organizations. Field (2005) defines a sample as “*a smaller (but hopefully representative) collection of units from a population used to determine truths about that population*”. Sampling has enabled a number of researchers to make estimates of some unknown situations and characteristics of the population in question.

Sampling has been of vital importance as it enables to make effective budget and time constraint in case a study is done in a place with a big population. Moreover, sampling enables the project team to come up with a high degree of accuracy and reliability. This in turn produces more accurate results.

The study has been done using purposive sampling approach. This technique was used in order to help in the selection of capable respondents to the questionnaires.

3.4. Sample size

The project team managed to meet and interview about six (600) hundred people where hundred (100) of them were fully engaged in in-depth interviews, other one hundred (100) people were engaged in focus group discussions as well as provision of questionnaires to four hundred (400) who were fully engaged in agriculture, health, education and business. This is further shown in the table below:

Table 1: sample size analysis on questionnaires provision

Group	Total supplied	Total returned	Percent of response
Education	100	100	100%
Agriculture	100	80	80%
Businesses	100	90	90%
Health	100	90	90%
Total	400	360	90%

(Source: Author)

3.5 Data collection methods

Several methods were deployed to make this study successful in the collection of data depending on the nature of the study and type of information required. Both primary and secondary methods were applied during data collection process.

3.5.1 Primary data

Self-administered questionnaires were distributed to all stakeholders including people dealing with agriculture, health, education and business. Also observation (community walk through) and in-depth interview as well as focus group discussion methods were used to view various ICT methods and equipment's used to carter demands of the community members as elaborated below.

3.5.1.1 Questionnaires:

The questionnaires were used and they consisted of different types of questions, such as yes/no questions which were expected to be used when the project team was in need of lead questions. Moreover, the project team used the Likert scale that was developed in 1932 by Rensis Likert. This scale intended to assess respondents' agreement or disagreement on a five-point scale. In this questionnaire, the respondents gave their insight on groups of statements such as: agree, strongly agree, neutral, disagree.

Kultar (2007) elaborate that when designing the questionnaires, it is very important to put the questions in order by starting with general questions to more detailed questions.

The questionnaire consisted of varied number of questions depending on the professional field of the respondents (health (10 questions with 18 sub questions), education (32 questions), agriculture (20 questions) and business/economic development (15 with 26 sub questions)). All questionnaires were divided into parts from multiple responses, open ended questions to close ended questions.

Questionnaire Distribution and Data collection

After the thorough preparation of the questionnaires, they were distributed by hand to community members, teachers, doctors and nurses, as well as recipients dealing with business activities.

3.5.1.2 Observation

This refers the method of data collection where an individual watch or walk through the actual process of the system. This technique was very important in that; it helped the project team in collecting original data when it occurred. Using observation is sometimes challenging as it may be done in accordance to observers biasness. Also it is assumed to be slow and expensive process.

This method was used with other data collection methods to enable the project team understand what was really happening in the communities especially on looking the available ICT resources and their effectiveness.

3.5.1.3 Interviews:

The project team conducted a number of interviews including in-depth interviews to people from different cadres (health, education, agriculture and business) and focus group interviews to a number of people so as to have their views with regards to the availability of ICT resources, peoples' awareness and readiness to use those systems as well as impact of those systems to the communities.

3.5.2 Secondary data

Secondary data was collected through perusing various sources including the Government Websites, District and regional documents, ministry of Science and Technology policies, manuals and procedures. All these data collection methods ensured triangulation for data collected is well achieved. The below diagram illustrate more.

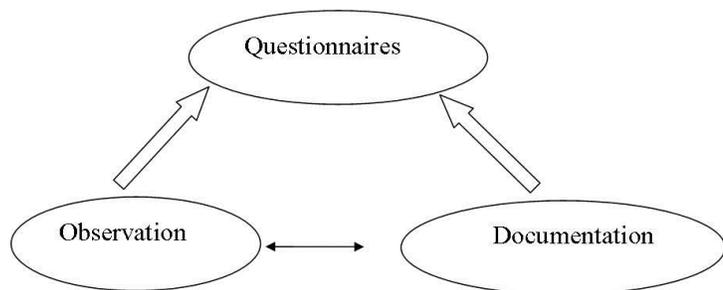


Figure 3: Use of triangulation method

(Source: Author)

As shown in the above figure, questionnaire was the main method used to collect data in this study. Yet observations (community walk through) as well as documentation were also used to help the project team to achieve the findings from the questionnaires.

3.5.2.1 Documentation

This method was used to collect secondary data where the project team passed through a number of available documents in the two Regions. The project team used this method in order to review both published and unpublished documents.

Also various reports from the two regions with regard to government initiatives on implementing national broadband backbone, building ICT knowledge and awareness as well as integration of ICT in district councils were reviewed. Some information was restricted to the project team by the Government Officials due to some confidential restrictions as claimed by one of the officials in the Manyara region. However, some of the staff members from the Government entities including the District administrative Secretaries, District Education Officers and Ward Executive officers participated in the projects data collection activity.

3.6 Data collection period & Analysis

The data collection activity subject to our project time line was to be conducted for six (8) weeks in both regions but due to these delays, two (2) weeks were added and instead of completing the survey on 16th August, 2013, we had to complete the survey on 30th August, 2013.

Statistical inferences as well as numerical estimation were used to analyze the type of data collected. Also the questionnaires contained both open as well as closed questions. These type of questions enabled the project team to be able to analyze all the responses and also using the attained data to support report recommendations and conclusion.

In dealing with quantitative data, the project team decided to use SPSS (Statistical Package for the Social Sciences- version 13) in order to analyze the data received from the field. As supported by Bryman (2004), the statistical package for social sciences is widely used for doing analysis. Some application used in analyzing data included Statistical Packages for Social Sciences (SPSS), MS Excel and Epi Info. These applications helped the project team to examine the availability, use, peoples' awareness and readiness, as well as effectiveness of ICT in resolving socio-economic challenges in the selected regions.

3.7 Project Monitoring

Direct involvement of the local leaders in the communities to provide quarterly reports to the project team with regard to success and failures of the implemented solutions (*mobile application in agriculture, community members to attend local ICT training centers once per week for training and accessibility of the created website by all community members*). The community leaders have to communicate with the project leaders by sms, emails, letters or calling after every three months with regard to how the solutions have been working

Moreover, the project team will be communicate with the headmasters of secondary schools after every three months on the challenges they face towards the use of computers in their daily academic activities, teachers response rate, their computer assessment reports (hardware and applications), teachers assessment on ICT readiness as well as success and failure of the use of computer in a school.

All these leaders have to fill out the forms which have been designed by the project team (hardcopy/softcopy) to ensure effective monitoring of the success and failure of the project. The project team will be monitoring and evaluating the proposed applications and subject to funds availability it will support provision of the same application to other places in the country. The project team will also be visiting the schools, farmers and health centers to monitor and evaluate all ICT initiatives implemented by the project and modify the solutions subject to the users' recommendations.

3.8 Project Management

Without FIRE support, the team could not be able to conduct this project in the selected regions. With FIRE, the team managed to reach different places and saw the challenges facing people in their environmental and socio-economic issues specifically women, girls, marginalized people, and all community members.

The team also managed to effectively make use of the research tools, understand the challenges in the field activities as well as understanding the real ICT situation than what they actually knew from the government point of view. The training provided to project team members has been very successful in building research capacity in the College and many academicians at large. This will actually enable more academicians to come up with their proposals and conduct research activities and finally make more publications.

Ability to work under pressure especially where there was no cooperation from the management/Local government officials and in remote areas was another better experience achieved by research team members in the field.

Moreover, the project has contributed a lot to the project team members to come up with more strategies that will help all people despite of their condition, financial status, location, tribe, ethnicity by encouraging ICT community centres to start provide free training courses to some community members especially women, girls, disabled children and marginalized people for at least two (2) hours a week. The College will provide all relevant materials that would help to make training successful.

3.9 Project Sustainability:

This project is expected to be sustainable in the sense that, the suggested applications to be developed by the project team will have ability of managing themselves. For instance, while creating website⁶, the project team has requested from a number of stakeholders to put their advertisements in the front page of the website of which they were charged some amount of money to enable the website to be sustainable. The amount of money used to pay for the domain, hosting of the website as well as the website maintenance activities.

Moreover, the mobile application which is now working to one hundred (100) people also will be sustainable as the community members are paying subscription fee when they information any from the system to enable the application exist which costs them almost 0.09 \$ per sms.

⁶ See www.habarikatz.org

Due to the fact that both applications will be under the ATC, the project team believes on the College support to sustain them. Also the College is in position to seek support from other development partners to make sure that the already established applications will be sustainable and well maintained.

3.10 Partnerships with other organizations, researchers and community leaders

The partnerships developed during the project especially during data collection activity include partnerships at Regional, District, Ward and at village levels. Regional Administrative Secretaires, Regional Education Officers, District Executive Directors (DED), District Administrative Secretaries (DAS), ward executive officers (WEO), village executive officers (VEO), nearby universities, Schools and some of the agricultural and educational organizations were all connected with this project and they made a close follow up with the project successes and implementations. These partnerships were due to the fact that they contributed a lot to the successful achievement of the research as most of them engaged in providing letters of approval towards data collection activity as well as acting as our potential sources of information specifically during In-depth Interviews. They contributed a lot in giving us the real ICT situation from the level of Council to the Village level.

Partnerships with all the mentioned stakeholders further helped in connecting the project team members with local community leaders and District professionals in ICT, health, agriculture, environment, business, education and livestock keeping. Other important partners who contributed to the successful achievement of the projects' objectives include community members, community organizations and groups and ICT professionals.

3.10.1 Involvement of project beneficiaries, during phases of project implementation

The involvement of our projects beneficiaries including community members, government officials, education professionals, ICT professionals, academicians, business partners, and prospective applicants to FIRE program, Swedish International Development Agency (SIDA), government authorities and other project funders was very positive from project initiation to its implementation. They were highly involved in different aspects. Some of them were involved in funding the project, providing ideas in best implementation of the projects' solutions to the community members and provision of letters of approval and direction towards the research work.

Others were fully engaged in in-depth interviews and they helped a lot in providing current ICT situation from the level of council to the village level at large.

Other beneficiaries involved in provision of relevant information needed by the project team as they fully engaged themselves in answering the questionnaires and participated in focus group discussions.

These stakeholders' involvement motivated the team in making comparison between what was said by the community leaders, government Officials and the community members on the understanding and application of ICT in their daily activities.

3.11 Project output and dissemination

The project has managed to get awareness of the real ICT situation existing in the community (Arusha and Manyara regions) subject to what was portrayed by the local Government Authorities. The project team has also been able to identify the number of ICT professionals in the regions, ICT Literacy level which is very low and it needs a lot of effort to resolve the situation, number of available ICT resources in the communities which are very low and mostly mobile phones, radio and televisions are the ones which are available. The team has also been able to identify some ICT applications available in the communities of which most of them are not in local content and are of very high cost. This has in turn made them not to be sustainable for a long time.

The project team has managed to meet the following objectives:

One, conducting field research aiming at identifying the development, deployment and enhancement of ICT network infrastructure, devices and contents used in the communities to support information dissemination;

Two, understanding various applications and resources used and solutions taken towards supporting information dissemination by carrying out field-based research activities that will provide information about the availability and effectiveness of ICT in resolving environmental and social-economic challenges in the regions of Arusha and Manyara.

Furthermore, the project team managed to create a website with two languages and with environmental, social, economical, educational and agricultural contents. Also, the project team managed to conduct data analysis of the collected data, establishment of a mobile technology content that intended to enable community members from Arusha and Manyara to request various agricultural information like market information (prices), types of fertilizers relevant to the type of crops to be grown, and seasonality of the areas, best seed types to grown and weather information.

Moreover, the project is expected to share and disseminate information by making publications, workshops, attending seminars, making presentation in conferences, sharing information in the created website and other social media, putting information in the hard copies and compact Discs.

Provision of training to all secondary school teachers in the selected regions on ICT basics is another objective which is to be done Arusha Technical College on June 2014.

This will help them to have a wider knowledge, morale and awareness on the role of ICT in education. Subject to its success, the team will also provide training to health workers.

3.12 Challenges encountered during the study

Among the challenges encountered during data collection was as follows:

- Delay of a number of activities due to long processes of getting permission from the regional level through Regional Administrative secretary (RAS), then to submit a letter to the three (3) Districts through their District Administrative Secretaries (DAS) and then submit those permission letters to the District Executive Director (DED) of the selected Districts. After getting approval letter from DED, then we were directed to the Divisions and then to the wards that we wanted to conduct our survey. This whole process took almost the whole week due to delays in the Offices of which affected the number of data collection activities.
- Distance between the wards selected. The project team decided to randomly select three (3) wards in each district. Distance between wards differed in the sense that some wards were close to about ten (10) kilometers each and others were far from each other to about forty five (45) kilometers.
- Difficult to get the key personnel for interviews due to interference with political leaders meetings in some of the wards. This in turn delayed some activities as we had to wait for the meetings to be over so as we may talk to the community members.
- Confidentiality of data in the organization. Some information were not easy to be accessed during conducting of the study due to their confidentiality to the organization. This affected the efficiency and effectiveness of research work.
- Poor knowledge of the respondents on what is ICT, its role and relevance in daily life.
- Lack of enough cooperation to some of the respondents in answering questionnaires, participating in in-depth interviews as well as in focus group discussions due to fear from their husbands, lack of confidence, time constraint and poor academic background.

3.13 Research ethics

The project team took into consideration on a number of principles and ethical issues relating to the research activities as suggested by Saunders et al. (2007) and Bryman (2008). These include data confidentiality submitted by the participants, as well as their privacy and secrecy.

Also the research approach avoided embarrassment for those who chose to participate in the study. Moreover, the project team made it clear to all participants that completing the questionnaire is voluntary, and that they were free to withdraw themselves from the study at any time.

Also as Saunders et al., (2007) and Bryman, (2008) suggest, confidential and personal data are not required and this had to be confirmed by the project team.

3.14 Chapter summary

This chapter has highlighted on the background of ICT especially on type of ICT resources available in the communities, level of understanding of those resources as well as their effectiveness to cater demands of the community members.

Qualitative and quantitative research approaches has well been elaborated together with research methods that were used in conducting the study. Pilot Testing has also been done to make sure that all the questionnaires were well constructed and understood by the respondents. A number of respondents about six hundred (600) were expected to participate in the study in the selected regions.

Out of the six districts, the team managed to encourage and support four (4) ICT training centres in Manyara Region to train community members for at least two hour a week on ICT basics and the project team has provided them with training materials both on the soft copies and printed copies.

It is true, with this project, the findings has very much inspired not only the College but also the project team to the extent of being ready to teach ICT course for free to the secondary school teachers and the community organizations' centres. The team is ready subject to availability of their time and time for the trainees to either attend in the College or to visit them in their areas for the mentioned short course. Moreover, the project team has been much inspired by the research in the communities of which they have started to support them in terms of capacity building and computer maintenance.

CHAPTER FOUR: EVALUATION OF RESULTS

4.1 Introduction:

Many countries see the importance of ICT not only in technological aspect but mostly on its abilities to create more access to information and communication to under privileged societies. It is through this that many countries have established various organs dealing with ICT promotion due to the fact that unless areas with low advancement in technology have ability to catch up, the increasing technological advances in developed nations will only serve to intensify the already-available economic gap between technological "have" and "have not" areas. This is also to be implied in Tanzania where most of its population is totally denied access to real time information through this science and technological era.

The aim of this study was to find out on the role of ICT in solving environmental and socio-economic challenges in Tanzania, case of Arusha and Manyara regions. Moreover, in achieving this, the project aimed at fulfilling the following objectives:

- To identify the development, deployment and enhancement of network infrastructure, devices and contents to support information dissemination;
- To understand the applications used and solutions taken towards supporting information dissemination
- Carrying out field-based activities that will provide information about the availability and effectiveness of ICT in resolving environmental and social-economic challenges in Tanzania. The fieldwork includes: In-depth Interviews (IDIs), participatory Focus Group Discussions (pFGDs) and Community Walk Through (CWT) in Arusha and Manyara
- Analysis and creation of the study findings to be shared and discussed with several stakeholders (Local authorities, Government, Development partners, International Organizations and Institutions)

Out of the questionnaires provided, 10% of the respondents did not return them and this represents a response rate of about 90% (thus 360 questionnaires were collected). Of all respondents who participated in questionnaires, male participants were only 47% out of 53% of female participants as elaborated in table 2 below.

Table 2: Respondents by gender in the project

Gender	Questionnaires provided & returned			
	Agriculture	Health	Education	Economic Devt/Business
Male	32	41	71	45
Female	48	49	29	45
Sub total	80	90	100	90
Grand Total	360 responses			

(Source: Field research)

4.2 Important findings and outputs of the project

The most important findings and outputs of the project were as follows:

Firstly; it was found out that the ICT resources that facilitate information dissemination in rural communities are very rare (90% of respondents during Focus group discussion). Most of them are not in local content as Mutula (2002) observes that the general irrelevance of the contribution by African countries to online content is the use of the languages that represent the minority of the population only⁷ and mostly they are found in the urban areas by 70%. In most of the rural areas, people are completely denied the access to information (65%) despite the fact that in all households visited, there was at least one owner of the mobile phone (90%). The national network backbone as portrayed by the government authorities has not yet reached in all rural areas and even in urban areas visited; national network backbone is only at the initial stage of installation of their infrastructure.

It was also found that there are few ICT community training centres (4%) in the rural areas which are mostly privately owned by individuals and churches. Mostly in urban areas there were a number of internet cafes but most of them were business oriented places. In turn community centres were hardly found in urban areas.

4.3 Analysis on ICT in Agriculture

ICT in agriculture is a very emerging field focusing on the development of agriculture and rural advancement in Tanzania. Despite lack of enough analytical researches done on ICT in agriculture, yet this initiative aims at involving application of inventive and innovative ways to use ICT in the rural areas.

⁷ According to Mutula, "The continent's proportion of web content was estimated in 2001 to be 0.04% of the global web content. ... This situation is exacerbated by the fact that Africa's content on the web is largely in the English language, which is spoken by mostly the educated elite. Lack of local content in a widely spoken and understood language reduces the demand for Internet use in Africa" (p. 35)

It can help to provide accurate and real time information necessary for the farmers that can facilitate a better agricultural output. The types of crops grown in the two regions are as follows:

Table 3: Types of Crops grown in the selected regions

SN	Type of crop	Planting	Harvesting
1	Wheat	December - February	April- June
2	Maize	December -January	June-August
3	Peas	December -early February	August-September
4	Beans	December, march, July	February, June, October
5	Cassava	December, march, July	February, June, October
6	Sesame	December -January	April
7	Millet	December- February	From April to June

For people dealing with agriculture in most of the areas in the two regions to have access to government crop and farming tools subsidies, they had to be in groups dealing with various types of farming activities. One of the groups called Mwangaza located in Manyara region under their leader Mr. Issa Ali said “...our group consists of twenty people and we grow both food (peas, beans, banana, sweet potatoes) and cash crop (maize and wheat) production, but the challenging thing is on getting right information of type of seed to grow and price information during harvesting”.

The benefits of ICT are yet to reach to all farmers in the country, especially those who have poor economic condition and social constraint and still depend on agriculture as the back bone of their lives. Other factors affecting them may be illiteracy, language barrier, and unwillingness to adopt the new technologies which in turn it is the role of the government to strengthen public private partnerships to combat this situation. The Project team managed to interview about eighty (80) participants who were mostly engaged in agricultural sector.

ICT in Tanzania plays a major role in agriculture as it can help to provide access to information with regard to pre- harvesting, cultivation and post harvesting information, ICT can provide market conditions, product prices. Moreover, many people suggested that ICT can help to create direct link between cultivators and direct buyers and thus help to give farmers more chances to bargain for the prices.

About 70% of the respondents recommended setting up community ICT centers that would help to extend access to various types of information especially on education, health, tourism, agriculture, business as well as environment.

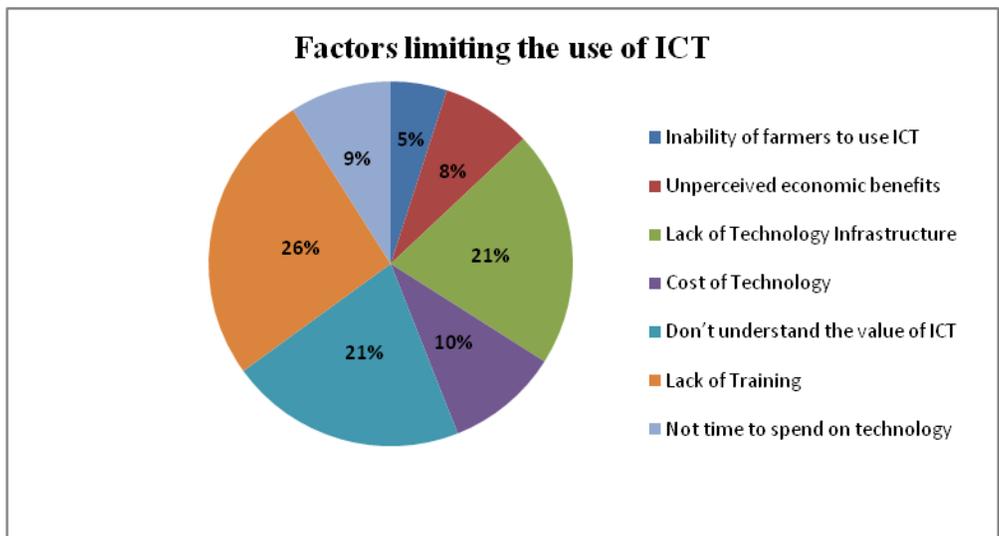


Figure 4: factors limiting the use of ICT in Agriculture

Despite having agricultural professionals district to ward levels, yet their limited number was a big constraint to community members in getting real time agricultural education. For instance one ward in Manyara region named Qash has six villages and has agricultural professionals in only two villages. It is lack of real time information on agriculture that contributes to poor living standards in most of the areas. Many people dealing with agriculture do not get enough education on proper methods to grow their crops, they don't get enough information regarding the types of seeds to be grown as some seed companies do come and provide seeds to community members for free promising to become their product buyers and at the end people are left suffering on the same prices they were used before. Community members also lack information on prices of their products and thus when they harvest, business people use to buy their products at the prices best known by them and thus they don't know how similar products are sold in other regions.

Moreover, it was found out that, many community members are not aware of Information and Communication Technology (56%) and what it implies despite the fact that they live and use some of the ICT resources like mobile phones (90%), radio (100%), television (57%) and computers (19%).

It was commented by one of the agricultural officer in Katesh District during focus group discussion that “... despite all challenges facing farmers, yet the government is in the process of establishing the use of

Global Positioning System (GPS) in all villages and wards so as to see how best community members can be supported”.

He further commented that “... *there is a need of using ICT to help people get information on weather condition, crop status, product prices and that would help to link customers with farmers direct”.*

About 29% of the respondents commented on inefficient and inferior service to be experienced if ICT will not be used in farming activities in the future. Many respondents commented on ensuring product quality and credibility by the use and application of ICT in agriculture as elaborated in the figure below.

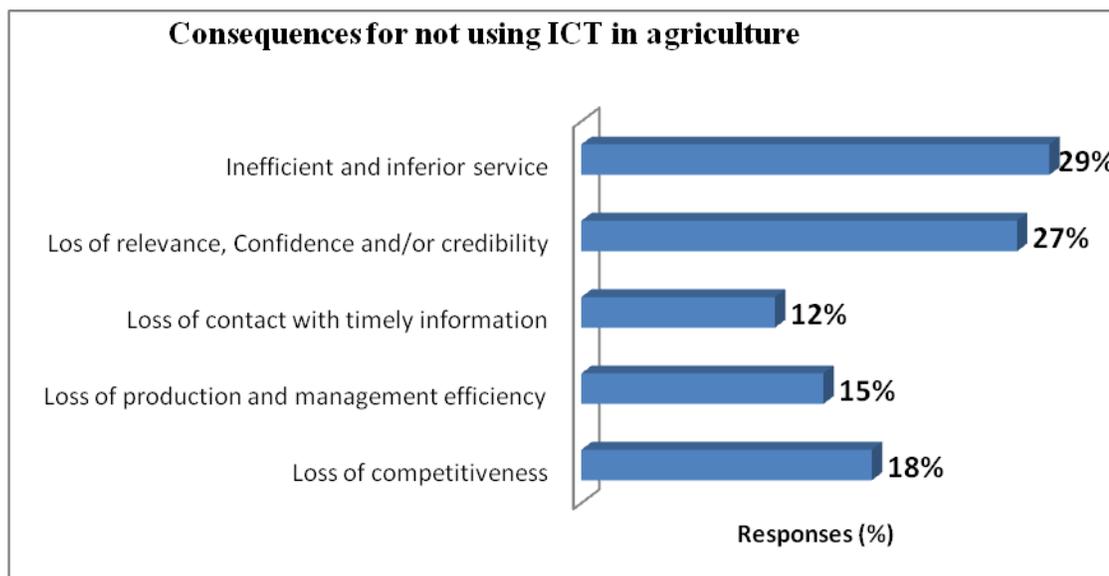


Figure 5: Consequences for not using ICT in agriculture

Despite a great need of having ICT initiatives in many communities yet there are a number of limiting factors to achieve this. One of the biggest challenges is on the cost of having both knowledge, ICT resources and sustaining them for better use as commented by many respondents (34.7%). Technical knowhow on ICT resources and their importance is another hindering factor mentioned by many people. Lack of training on these ICT resources may be another hindering factor as one ward leader in Nangwa commented “...*today people do not know if a mobile phone can be used to get any other information apart from calling and texting, they have to be educated and for mobile applications to be accepted, they have to be affordable, simple and of understandable language that can be understood by all,*”

4.4 Analysis on ICT in Education

The Project team managed to interview about one hundred (100) participants who were mostly engaged in Education where 71% of them were male where as female were about 29%. Most people, who were fully engaged

in Education, commented on lack of training on the ICT resources (16.8%), lack of knowledge on computers (16.3%) as one of the biggest reason hindering them to use computers as analyzed in the below table.

Table 4: Reasons for not using Computers in School

REASONS FOR NOT USING COMPUTERS IN SCHOOLS		
	Responses	Percent
Lack of time to use computers	40	6.7%
Lack of knowledge about computers	97	16.3%
Fear	47	7.9%
lack of confidence	84	14.1%
lack of training	100	16.8%
my age	58	9.7%
Little previous experience.	33	5.5%
Not sure how useful computers are	48	8.1%
Computers are not accessible	68	11.4%
Management doesn't care if I use computers or not	20	3.4%

Many people in the selected communities commented on poor motivation on use of ICT invested to them from the government, ICT professionals, developmental partners, university researchers of which it is the time to educate communities and find the best alternatives to educate them on the role and use of ICT resources in development.



One of the research team members interviewing the Headmaster in Manyara region

A number of respondents (teachers) have shown a great need towards use of ICT in their teaching and learning activities despite the fact that most of them had no access to ICT resources.

Many schools visited were found to have some ICT resources including Computers and some were used to teach students. Despite limited ICT resources in many secondary schools, many of them still had a plan to have more ICT resources that will be used by both teachers and students in teaching and learning.

It was found that the Government had insisted every secondary school to have a computer laboratory, despite a big challenge of motivation to use those ICT resources, lack of ICT professionals in many schools and lack of electricity. In some of the schools visited by the project team, the computer labs were found to have not been used for a long time by either students or their teachers despite having some of usable ICT resources. One of the teacher in Hanang Secondary school commented that “...we lack enough motivation on the use of computers, we have never been trained anything about ICT, may be currently employed teachers who are taught ICT in their Colleges before they come here”.

4.5 Analysis on ICT in Health

The Project team managed to interview about ninety (90) participants who were mostly engaged in health activities. It was found that many activities done in the hospitals and health centers were manually done and data were recorded in the files and kept in the file cabinets and shelves.

It can be seen that out of all respondents, 54.5% were female and the 45.5% were male. Many of the respondents (47.4%) were aged between 20 and 32 years old. This distribution correlates with Tanzanian Population in terms of age and gender (NBS, 2006).

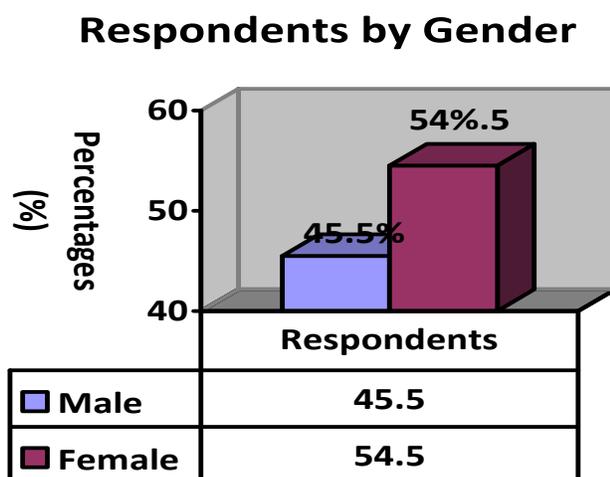


Figure 6: Health respondents by Gender

4.5.1 The adoption and use of ICT by patients:

Figure six (7) below provides the overall picture on the use of ICT devices and services of the surveyed areas (Arusha and Manyara). The use of Radio has dominated much such that about 70% of the respondents have been using Radio to get health-care information. Also, use of Television (TV) accounting to 50% of the patient respondents. The use of computers, emails, mobile applications and fax machines were the least in terms of use by the respondents. This indicates that traditional means are still heavily used by many patients in Tanzania. This implies the slow speed in the use of computers and other modern health facilities in most of the developed world. Another suggestion could be that many public health services have to effectively make use of Television and Radio to so as to be able to reach larger number of the population with health information.

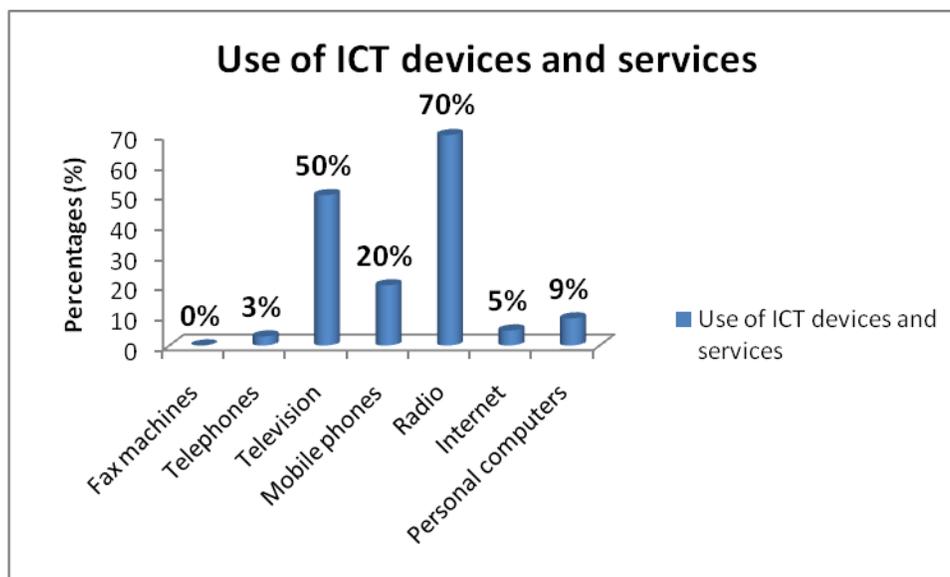


Figure 7: Use of ICT resources by patients

Despite a great need on the use and application ICT in simplifying many activities in the health sector, very few hospitals of about 10% had initiated some systems like Health information systems. These systems were mostly available in the district hospitals, referral hospitals and regional hospitals. There were a number of reasons stipulated by some of the health professionals on the challenges they face in accessing and using ICT as shown in the figure seven (8) below.

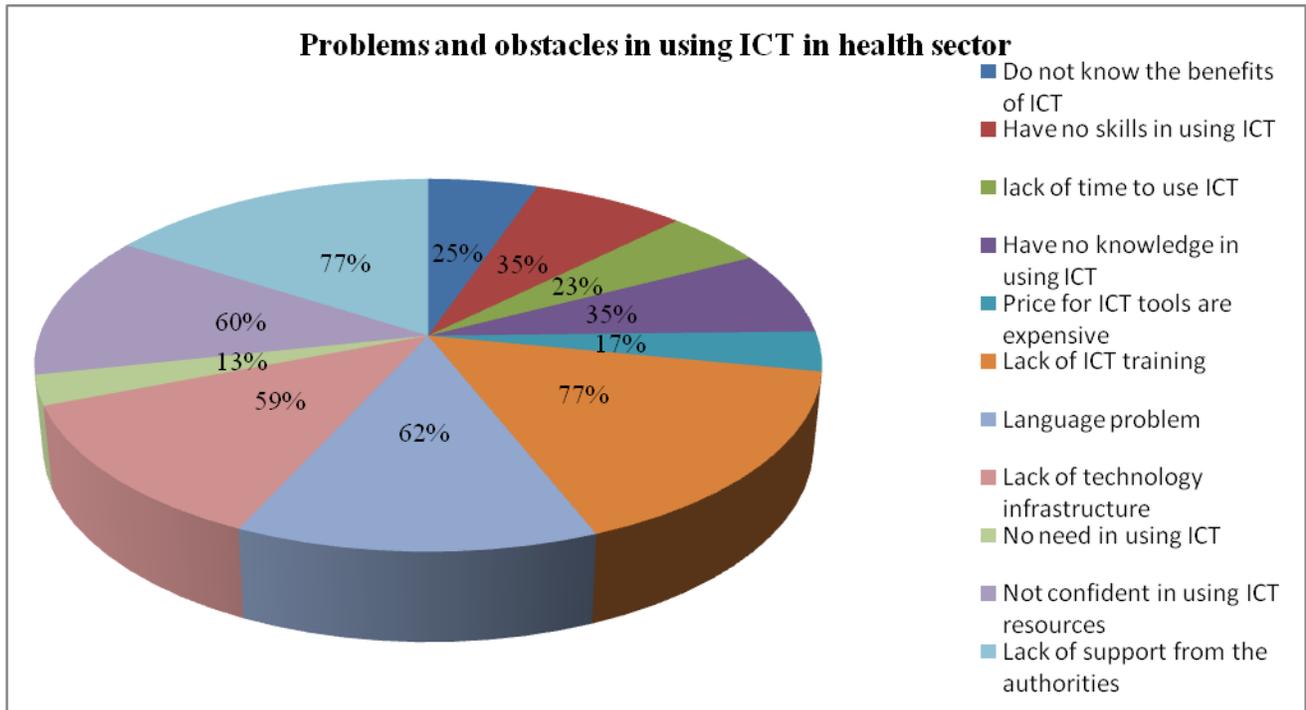


Figure 8: Problems and obstacles in using ICT in health sector

Among the reasons commented by many health respondents were poor support from the health management (62%), problem of language used in the health applications (77%), and the biggest challenge was lack of ICT training to most of the health workers (77%). Some of the patients interviewed by the research team commented that “... *if there is any solution towards fastening health service, it will be of great help because we use to stay in the hospital for the whole day despite being out patient*”.

One of the coordinators of home basic care said most of the information from the health centers is supplied to community members through advertisements, radio, and letters to the village officers. This has been a big challenge as many people use to get information lately. He further commented that if ICT resources are to be put in place, this problem will reduce very much and the work will be simple. Nurses will be able to attend more people than they are used to do now.

The use of ICT applications especially e-health is inevitable in the current world of science and technology. It is through use of these applications that will help to improve health care services in the country. These findings provide an insight to various sectors including the ministry of health and social welfare, private organizations and health policy formulators to emphasize the adoption of e-health systems for improved services in all health centers both in urban and rural areas.

The main reasons for implementing e-health systems are broad subject to the discussion with some Doctors and patients during In-depth Interviews and Focus group discussions.

Firstly, they help to extend geographic access and thus overcoming long distances between physicians and patients by replacing a traditional office visit as it is conducted now. Moreover, e-health facilitates effective communications between health workers and patients even outside regular working hours. Most of the health workers had different perceptions and views regarding the support of ICT in their daily activities as elaborated in figure 9 below.

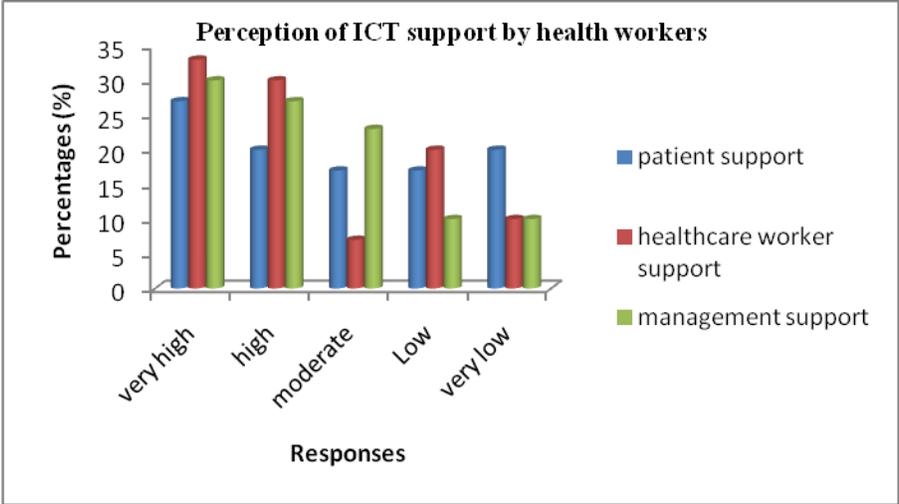


Figure 9: Perception of ICT support by health workers

CHAPTER FIVE: KEY LESSON LEARNED, CONCLUSION AND RECOMMENDATIONS

5.1 Key lessons learned

From the perspective of involving community leaders, ICT professionals and government support, the following are lessons learned:

- Well motivated and trained District ICT professionals and other workers in the district (Secondary school Teachers, trainers in local ICT community centers, and other development partners) have the potential to influencing and changing people's minds on the use of ICT resources and applications to resolving health, education, business, environment and agricultural activities.
- Community leaders (ward executive Officer, Village executive Officers and District Officials) can significantly contribute to ICT knowledge provision to the community members and ICT outcomes if they are fully engaged fully in ensuring ICT resources are effectively used in socio-economic challenges facing community members.
- Investing in strengthening students' skills and knowledge on ICT issues at young age has effective, immediate and long term development outcomes within communities, as this is a powerful gateway to influence change in adults.
- It is possible to use ICT resources in all communities if they are of local contents, cheap, available and if people are given knowledge on how those ICT resources can be used subject to people's traditions, customs and culture

5.2 Conclusion

Despite government initiatives on ensuring Information and Communication Technology (ICT) in the country, it was found that most of the implemented ICT solutions have only ended at the level of council and mostly in urban areas. Many community members have been denied access to information resources including ICT. Of all areas visited by the project team in the selected regions, it was found that, the only ICT resources available were radio, televisions and mobile phones of which people had only been using them for calling, messaging and to some extent mobile money services. Some people who had access to Televisions were challenged by the biggest problem of electricity fluctuation, and other people were even not able to afford costs of having electricity in their homes. The current government initiative through Rural Energy Agency (REA) should be applied in all rural areas in the Country.

For the available ICT resources to be effective, they have to cater demands of the community members subject to people's levels of education, language content, financial positions, coverage as well as their availability.

The project team believes that if good infrastructures are ensured to reach all people in the rural areas, if ICT applications are converted into local contents and if more emphasis and education is provided especially to secondary school students, it would be easier to impact the information and communication technologies to all community members in the country and hence every person will adversely change with change in time and technology.

Thus, the project team believes that, ICT is in a very high position to offer opportunities for all as it requires confidence, local service and establishment of a number of local technologies.

5.3 Recommendations

The project team has a number of recommendations as follows:

- Due to inadequate ICT capacity and know how in the community, the project team requests financial and material support to provide training to the school teachers, students, emphasize on the use of the Computer syllabus in secondary schools, train local leaders and community members and health workers on how to use ICT tools in the selected regions and the whole country at large.
- The project team recommends that, implementation of any application or any solution should only be done after a thorough investigation between needs of the community members and applications' contents. Thus ICT resources have to be customized to address different information needs in various aspects in a useful format so as to assist in addressing problems people face.
- Unless all factors remain constant, the project team believes that with the support from the project funders, implementation of the suggested applications can also be applied to other communities in all regions of Tanzania to resolve similar problems.
- The project team also recommends to the government through the rural Energy Agency (REA) initiative to subsidize the costs of tapping electricity services in all rural areas in Tanzania to enable a lot of community members to have and use electricity.
- Due to the fact that most of people in the two regions especially majority from rural areas lack awareness on developments in the ICT sector and its potential contribution to national

development, there is a need to provide education about developments in the ICT sector, particularly on availability of broadband communication facilities, and how these developments can be used to harness and enhance economic development.

- Research and Development (R&D) activities in the ICT sector are limited in Tanzania which makes it very difficult to establish or predict trends in the sector without carrying out extensive research. Stakeholders (government and private), could take an interest in research and development activities as a basis for sustainable growth and development of this ICT sector.
- Mobile phone operators can help ensuring quality control through the sale of low-cost quality handsets, reduce communication costs subject to affordability of low income people in rural areas, and put much pressure on applications of mobile phones in health, environment, business, tourism, education and agriculture.
- For fast adoption of e-health systems that can cater demands of many low income people in far geographical areas, adoption of health information systems that support mobile technologies are highly recommended.
- Policy makers are also advised to effectively make policies that can make changes to the current situation so as to create an enabling e-Tanzania for the adoption of e-health, e-education, e-governance, e-environment, e-agriculture and e-business

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