2018-08

A framework for enhancing sustainable access and use of agricultural market information by small-scale farmers in Tanzania

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A FRAMEWORK FOR ENHANCING SUSTAINABLE ACCESS AND USE OF AGRICULTURAL MARKET INFORMATION BY SMALL-SCALE FARMERS IN TANZANIA

Mawazo Mwita Magesa

A Dissertation Submitted in Partial Fulfilment of the Requirements for the Degree of Doctor of Philosophy in Information and Communication Science and Engineering of the Nelson Mandela African Institution of Science and Technology

Arusha, Tanzania

August 2018

ABSTRACT

Agriculture in African developing countries employs majorities and contributes greatly to both human development and national economies. Despite its significance, the sector is dominated by small scale farmers living in rural areas and practising subsistence farming. Among the challenges confronting farmers include poor access to markets for their farm produce and lack of market information while selling their produce. The challenges have led to low prices of produce which also leads to low investments in agriculture, low productivity due to practising traditional farming methods, poor motivation to others to invest in agriculture, some quitting agriculture for other preferred jobs, and emergence of middlemen in the agricultural supply chain. Adequate market access and market information use can help farmers make important decision (e.g. plan what crops to plant, when to plant, and when and where to sell their farm produce).

With regards to market access and use of market information, farmers in Tanzania are challenged with unreliable and underdeveloped markets, lack of market information, poor or no infrastructure (e.g. rural roads, transporting means, and electricity), illiteracy, poor knowledge on agricultural marketing, and presence of middlemen. Based on the Capability Approach and Concepts, a framework for linking farmers to markets while providing them with market information was developed. The essence is to develop their (farmers) capabilities to become active market actors. Using a case study of farmers accessing agricultural market information from the NINAYO program, information capabilities of small scale farmers was measured.

Methods employed by the study include extensive literature review, data collection through field visits and surveys, interviews and observations, and by using questionnaires. Analyses of data were done using descriptive statistics, and regression analysis. To develop a framework, identified challenges in market access and market information use were mapped into various components of Livelihood Framework and the Empowerment Framework.

Thus, to improve access to markets and enhance use of market information by farmers, different actors (public and private) need to be involved. Different resources (education, financial, cultural, social and informational) of farmers need to be improved. The overall is to ensure farmers gain and benefit from their agricultural activities, their lives and economies improve, rural lives and economies improve and the national economies, at large, improve.

DECLARATION

I, **Mawazo Magesa Mwita,** do hereby declare to the Senate of the Nelson Mandela African Institution of Science and Technology that this dissertation is my own original work and that it has neither been submitted nor being concurrently submitted for degree award in any other institution.

	09-08-2018
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Prof. Jesuk Ko	**Date**

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CERTIFICATION

The undersigned certify that they have read and hereby recommend for examination a dissertation entitled ***A Framework for Enhancing Sustainable Access and Use of Agricultural Market Information by Small-Scale Farmers in Tanzania***, in fulfillment of the requirements for the Degree of Doctor of Philosophy in Information and Communication Science and Engineering at the Nelson Mandela African Institution of Science and Technology.

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Date: August 09, 2018

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Prof. Jesuk Ko

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Date: August 09, 2018

ACKNOWLEDGEMENTS

I would like to express my special appreciation and thanks to my supervisors Prof. Jesuk Ko and Dr. Michael Kisangiri, they have been tremendous mentors for me. Despite the long physical separating distance between us, Prof. Ko has always been with me, his enthusiasm, inspiration, and great efforts attributed by his timely response and advice, turned difficulties to simplest. Dr. Kisangiri, his office was always open for me, his patience, advice, and encouragement were highly helpful, he did not bother my frequent visits and interruptions.

Many thanks go to my institution, the Nelson Mandela African Institution of Science and Technology (NM-AIST), for granting me a scholarship to pursue PhD studies and turning my dream to reality.

I extend my thanks to officials, respondents and all in Hai, Mvomevo and Kilosa Districts and NINAYO members, who were voluntarily involved in this study during data collection.

Lastly, my thanks go to my colleagues Iddi Mrutu, Mohamed Dewa, Sylivester Kimbi, and Christina Nyakyi. Their encouragements, advices, and jokes made me to work tirelessly.

DEDICATION

To my farther, Magesa Mwita, and my late mother, Christina.

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LIST OF ABBREVIATIONS AND SYMBOLS

ACE	African Commodity Exchange
ACEs	agricultural commodity exchange services
AEF	Alternative Evaluation Framework
AES	Agriculture Economics Section
AMC	Agricultural Marketing Corporation
AMIC	Agricultural Marketing Information Centre
AMIS	Agricultural Marketing Information Services
AMITSA	Agricultural Input Market Information and Transparency System
AMSDP	Agricultural Marketing Systems Development Programme
ASDP	Agricultural Sector Development Programme
ATM	Automated Teller Machine
CES	Capability, Empowerment and Sustainability
CROMABU	Crops Marketing Bureau
DAFF	Department of Agriculture Forestry and Fisheries
DFID	Department for International Development
DSR	Design Science Research
ECX	Ethiopian Commodity Exchange
EGTE	Ethiopian Grain Trading Enterprise
FAO	Food and Agriculture Organization
FICOM	Farmers Information Communication Management
FOs	Farmer Organizations
GDP	Growth Domestic Product
ICT4D	Information and Communication Technologies for Development
ICTs	Information and Communication Technologies
IS	Information System
KACE	Kenyan Agricultural Commodity Exchange
KK	Kilimo Kwanza
KNCU	Kilimanjaro Native Co-operative Union
KNU	Kagera Cooperative Union
LMIS	Livestock Market Information System
MACE	Malawi Agricultural Commodity Exchange
MDB	Marketing Development Bureau
MIS	Market Information System

MORECU	Morogoro Regional Cooperative Union
MVIWATA	National Network of Smallholder Farmers Group in Tanzania
NCU	Nyanza Cooperative Union
NSGRP	National Strategy for Growth and Reduction of Poverty
OMA	Observatoire du Marché Agricole
POs	Producer Organizations
PRMC	Programme de Restructuration du Marché Céréalier
RATIN	Regional Agriculture Trade Intelligence Network
SAGCOT	Southern Agricultural Growth Corridor of Tanzania
SIM	Système d'Information sur le Marché
SIMA	Agricultural Market Information System
SLA	Sustainable Livelihoods Analysis
SLF	Sustainable Livelihood Framework
SME	Small and Medium Enterprise
SMS	Short Messaging Service
SSA	Sub-Sahara Africa
SWB	Subjective Well-Being
TANESCO	Tanzania Electricity Supplying Company
UCE	Uganda Commodity Exchange
UNDP	United Nations Development Programme
URT	The United Republic of Tanzania
USAID	United States Agency for International Development
VCA	Value Chain Analysis
WRS	Warehouse Receipt System
ZAMACE	Zambia Agricultural Commodities Exchange
ZIMACE	Zimbabwe Agricultural Commodity Exchange
ZNFU	Zambia National Farmers Union

CHAPTER ONE

INTRODUCTION

1.1. Research Background

Information and communications have always mattered in human development. Communicating information has been a means of transferring data, knowledge, experience, etc. from one individual to another. The means of disseminating and communicating information range from traditional ones (i.e. use of word of mouth, radio broadcasts, visits to sources etc.) to more specialized means by using the recent Information and Communication Technologies (ICTs). With the recent development of ICTs, communications have been easy and have bridged the distance gap between the communicating parties. Information and communication technology has turned the global into a single village. Travelling to access information at distant sources is no longer necessary due to the evolution of ICTs. Thus, uses of ICTs assure the availability of information regardless of distance and time.

Information and communication technology has revolutionized the way activities within different sectors are performed. It is no longer necessary for one to queue at the bank for hours or a day to make transactions such as withdrawing cash. Any time, access to Automated Teller Machine (ATM) or use of mobile-banking services allows one to make various banking transactions. Information and communication technologies have enabled distant purchase through online services. The agricultural sector is also benefiting much by utilizing the ICTs. Information and communication technology may enable farmers to get advisory services; and give them access to information which are necessary for making important decisions on their agricultural activities. Such information may help farmers to make decisions on best time to plant crops for maximum harvest, timing of selling farm produce for maximum gain, and the nearest market with good price for their farm produce.

Searching and accessing information is very crucial especially for small-scale farmers living in remote rural areas. Through search process, farmers can learn the weather condition which is important in their agricultural activities, best practises in farming, management of plant pests and diseases and market information. Usually farmers search for the same information season after season. But, farmers rarely find it easy to obtain answers to their searches, even if similar ones arise season after season. Sometimes farmers need to be aware of the changing weather patterns and soil conditions, and even the occurrences of epidemics of pests and

diseases. Availability of such information can greatly benefit farmers. Collecting and disseminating such information can be challenging, however, because of the highly localized nature of agriculture means that information must be tailored specifically to intended recipients.

Rural farmers involved in agriculture account for the greater part of the population of African developing countries like Tanzania. Aina (2007) reported that a population between 30% - 40% in North Africa to over 80% in West Africa are involved in agriculture. In sub-Sahara Africa, agriculture employs about 65% of labour force and accounts for about one third of its gross domestic product (Commission on Growth and Development, 2008). Governments of developing countries are trying hard to ensure that there is adequate rural development which would lead to effective and efficient agricultural systems (Alliance for a Green Revolution in Africa, 2014). Rural farmers are expected to supply food that will feed their respective countries. Smallholders provide about 80% of the food supply in Africa (Alliance for a Green Revolution in Africa, 2014). Thus, investing in smallholder agriculture is important as it may assure food security within these developing countries.

Despite the importance of agriculture in African countries, agricultural labour productivity has remained low (Alliance for a Green Revolution in Africa, 2014; Leyaro and Morrissey, 2013; Nkamleu *et al.*, 2003). Rosen and Shapouri (2012) noted that low productivity reflects low profitability in the agricultural sector and is a key factor in rural poverty. Several factors are associated with the low productivity in agriculture like e.g. unstable and changing climate leading to low yield, degrading soil condition, dependence on rain-fed agriculture, poor technology used by small-scale farmers, and low returns of the produce on selling (Alliance for a Green Revolution in Africa, 2014). Other scholars (Leyaro and Morrissey, 2013; Nkamleu *et al.*, 2003; Poulton *et al.*, 2006) have attributed the lower productivity to poor plans and policies in agricultural sector. Poor access to agricultural information has also been documented as a factor leading to low agricultural productivity (Lwoga, 2010; Manda, 2002; Mwakaje, 2010). Access to information may be beneficial to farmers living in rural areas. For example, if they have information on weather, they can change accordingly to ensure they plant at the right time for maximum harvest. The same, if they have harvested, they can access information which can enable them to make selling decision by choosing the markets to send their produce for sale.

Access to information in agricultural sector is an area that is attracting the attention of many

scholars in developing countries (Aina, 2007; Aker, 2010; Mwakaje, 2010). They are investigating the use of ICTs in providing agricultural extension and advisory services, use of ICTs in agricultural supply chain and use of ICTs in providing agricultural market information (Aina, 2007; Aker, 2010; Mwakaje, 2010). But this access is not easy, it costs. Balit *et al.* (1996) agree that adequate access to knowledge and information in agriculture is a least expensive input for improved rural agricultural development. Aina (2007) believed that farmers would benefit from global information for agricultural development. Access to agricultural information brings in some questions. For example, is it available to intended recipients? How is that agricultural information accessed? Is it relevant? Do stakeholders take appropriate actions upon receiving agricultural information?

Use of ICT in collecting and disseminating agricultural information is recently paving way in agricultural sector. Public and private sector actors have long been on the search for effective solutions to address both the long- and short-term challenges in agriculture, including how to answer the abundant information needs of farmers. Information and communication technologies are among the solutions, and have recently unleashed incredible potential to improve agriculture specifically in developing countries. Information and communication technologies are crucial in facilitating communication and access to information for agricultural and rural development. In countries like Tanzania where agriculture is among the national priority sectors, ICTs can potentially transform it by ensuring stakeholders are equipped with important information for their dealings. Collecting and disseminating such agricultural information may utilize available simple devices like mobile phones, televisions, and radio or use of specialized application software developed for such purpose.

But what is ICT? Can ICT really be useful and cost-effective for poor farmers with restricted access to capital, electricity, and infrastructure? First, an ICT is any device, tool, or application that permits the exchange or collection of data through interaction or transmission (Mcnamara *et al.*, 2011). With ICT, users can create, access, store, transmit, and manipulate information. It therefore includes such things as radio, television, video cameras and telephones. In principle, ICT has always been available, only that in this era rapid advances in technology have changed the traditional ways in which information was processed, communications conducted, and services made available (Gerster and Zimmermann, 2003). Gerster and Zimmermann (2003) described four characteristics of the modern ICT:

(i) Interactivity: ICT is an effective two-way communication technology. The flow of

information can be interacted with, information is no longer only received, but it can be created and offered more easily,

(ii) Permanent availability: the new ICTs are available 24 hours a day,

(iii) Global reach: geographic distances hardly matter anymore, and

(iv) Reduced costs: for many people, costs of communication have shrunk to a fraction of previous values and are relatively cheap. This allows for new opportunities for networking and new options for reaching set goals in a more efficient way

Information and communication technology is an umbrella term that encompasses the broad spectrum of communication devices such as radio, film, television, press, and telephone along with more participatory forms such as theatre, video or storytelling (Mcnamara *et al.*, 2011). It also focuses on the electronic end of the spectrum such as e-mail, the Internet, mobile phones and digital video (Mcnamara *et al.*, 2011).

Coverage and widespread use of ICTs can be noticed even in impoverished regions. Increase in their affordability, accessibility, and adaptability (Gerster and Zimmermann, 2003; Mcnamara *et al.*, 2011) have resulted in their use even within rural homesteads relying on agriculture. Many of the questions asked by farmers (including questions on how to increase yields, access markets, and adapt to weather conditions) can be answered faster, with greater ease, and increased accuracy. But this is changing as the types of ICT-enabled services useful to improving the capacity and livelihoods of poor smallholders are growing quickly. For example, Short Messaging Service (SMS) is now enabling mobile phones to be used as a platform for agricultural data exchange. Reuters Market Light, for example, services over 200 000 smallholder subscribers in 10 different states in India for a cost of US$ 1.50 per month (Mehra, 2010). The farmers receive four to five messages per day on prices, commodities, and advisory services from a database with information on 150 crops and more than 1000 markets. Preliminary evidence suggests that collectively, the service may have generated US$ 2-3 billion in income for farmers, while over 50% of them have reduced their spending on agriculture inputs (Mehra, 2010).

Thus, provision of agricultural market information can easily be facilitated using ICTs. This is the fact as use of ICTs in service provision is widespread in towns and is penetrating in rural areas characterized with poor connectivity coverage. The use of ICT (esp. mobile phones) is now common among rural communities in Tanzania and mobile network operators are expanding communication infrastructure and services to rural areas. Thus, availability of

and hence access to ICTs in rural areas can enable smallholder farmers to have access to agricultural information including agricultural market information.

Usually smallholder farmers access agricultural information for various purposes. Use of ICT can enable farmers to get agricultural extension and advisory services which are important in supporting and facilitating their engagement in agricultural production and help to obtain information, skills and technologies to improve their agricultural production (Christoplos, 2008). In developing countries, like Tanzania, characterized by shortage of agricultural extension officers (Rutatora and Mattee, 2001), use of ICT may help to complement such shortage. Information and communication technology may also be used in delivering climate and weather information to smallholder rural farmers. Information and knowledge about climate and weather information may help smallholder farmers plan their agricultural activities.

For so long ICT has been used to provide agricultural market information to different stakeholders in the agricultural sector. Agricultural information which is provided include (a) availability of markets for farm produce; (b) produce type, standard/quality, size and quantity, (c) buyers/traders, (d) price of produce, (e) transport information, and (f) seller or producer information. Availability of reliable market information can assist smallholder farmers to: (a) reduce the risks associated with marketing; (b) decide where to sell produce; (c) check whether the prices they are offered are in line with market prices; (d) decide whether to store; (e) decide whether to grow produce "out-of-season"; and (f) decide whether to grow different crops (Shepherd, 2011).

Information flow can be found in the agricultural value chain which encompasses the input supply, production, post-harvest, storage, processing, marketing and distribution, food service and consumption functions all along the farm-to-plate continuum for any given product (Pandey *et al.*, 2010). Agricultural value chain supports the physical product flows, financial flows and information flows (Barrett *et al.*, 2010; Pandey *et al.*, 2010). It includes many small-to-medium-size farmers and is characterized by buyer power due to economies of scale in governance (Fromm, 2007). Implications of the increase in buyer power to the participation of smallholder farmers in the agricultural value chain include rising barriers and exclusion to market entry, and limited access to export markets (Fromm, 2007). Pandey *et al.* (2010) noted that farmers are isolated from majority of the end consumers and have little control over the input costs or the proceeds from their produce, resulting in minimal profits.

To improve the agricultural value chain to work better for smallholder farmers, Pandey *et al.* (2010) proposed to decrease the transactions costs and increase market transparency. Thus, ICTs effectively leverage their insights into the agricultural value chain by allowing information flow, increasing transparency and enabling smooth flow of produce (Rao, 2007).

1.2. Statement of the Problem

Smallholder farmers in Tanzania and in other developing countries have always to make decision on three important issues when selling and marketing their farm produce. According to Shepherd (2011), farmers should make decision on (a) what to plant, (b) when to plant and (c) where to sell. Knowledge on what to plant is associated with the products that are highly demanded in the markets and thus give assurance of availability of consumers. When to plant is associated with the knowledge of the best time to plant for maximum harvest, depending on the climate of a given area. Knowledge of where to sell is related to availability of markets for specified farm produce. Thus, making selling decision requires an individual farmer to have knowledge on the markets and market actors (Mwakaje, 2010). Shepherd (2011) stressed that in this era of market oriented economy, farmers should make individual decisions about what, when and how to market the produce. Thus, access to agricultural market information is important when smallholder farmers should make decision in agricultural marketing activities.

Efforts to provide agricultural market information to smallholder farmers and other stakeholders have been changing time after time depending on the available technology and media. Uses of traditional media have been prevalent for sometimes and are still being practised. Still farmers visit markets to learn different marketing variables, others depend on their fellows for getting market information, radios and televisions are broadcasting agricultural market information, and some daily and weekly magazines in Tanzania are publishing market information. Also, farmers share agricultural market information among themselves. With media like radio, television or newspapers, agricultural market information such as price are broadcasted on weekly or monthly basis. In some countries, telecentres were setup to provide agricultural market information like price and quantity. In Tanzania[1], the Crops Marketing Bureau (CROMABU), a public telecentre was set up in Magu on the shore of Lake Victoria for about 55 000 farmers producing cotton where they can access information about prices and trade flows (Gakuru *et al.*, 2008).

[1] http://www.iicd.org/projects/tanzania-abis-cromabu

Use of recent ICTs in provision of agricultural market information is noticeable in many African developing countries. With use of current ICTs, users (e.g. smallholder farmers) have prompt access to agricultural market information which can be accessed by or delivered to the media the users own or prefer. Devices such as mobile phones, laptops, and computers can be used to access the agricultural market information provided they are connected to the Internet. Possibly, the issue may be the availability of the Internet at the specified location.

Different initiatives by Governments, private sectors and NGOs are in place to provide agricultural market information to stakeholders. In northern and southern highlands of Tanzania, The First Mile Project, a seven years project was implemented in 2005 and used SMS, voice calls, and Internet services to improve the availability, timeliness and quality of information on market prices, and to improve communication amongst market actors (Lightfoot *et al.*, 2008). Another project in Tanzania, The Agricultural Marketing Systems Development Programme (AMSDP), was developed to provide farmers and traders with access to the latest commodity prices through SMS sent to their mobile phones so that they can negotiate more effectively on the sale of agricultural produce (Gakuru *et al.*, 2008). Also, another project, a rural communication platform, Esoko, working in some African countries including Uganda, and Cameroon sought to improve markets. Esoko allowed users to get real-time SMS alerts on market prices and allowed users to submit offers into the system directly using SMS.

In Uganda, between 2005 and 2007, a pilot study 'Farmers Information Communication Management (FICOM)' was developed to test sustainable ICT tools which can be used to effectively disseminate market information to rural farmers in the Jinja, Kayunga and Luwero districts of Uganda. With FICOM, farmers sent and received SMS messages with updates on market prices (Aker, 2010; Gakuru *et al.*, 2008). In Kenya, DrumNet project was developed among others intending to link smallholder farmers to markets, finances and information while encouraging the production of export-oriented crops (Ashraf *et al.*, 2006; Gakuru *et al.*, 2008). A 5 years project, The Agricultural Marketing and Information System for Malawi (MIS-Malawi), was intended to provide relevant and timely market information and intelligence to smallholder farmers and other market intermediaries (Aker, 2010; Gakuru *et al.*, 2008).

Most agricultural market information systems which were initiated, provided market price information services only, not commodity exchanges (Rashid *et al.*, 2010; Tollens, 2006). In

some African countries, some systems operated also as commodity exchange. Examples are Kenyan Agricultural Commodity Exchange (KACE) and the Uganda Commodity Exchange (UCE) both launched in the late 1990s (Rashid *et al.*, 2010). Others include the African Commodity Exchange (ACE) in Malawi established in 2004, Nigeria's exchange established in 2006, a new Zambian exchange (ZAMACE) established in 2007, and the much-publicized Ethiopian Commodity Exchange (ECX) established in 2008 (Rashid *et al.*, 2010).

Initiatives to provide agricultural market information to farmers in African developing countries are many. This suggests that there is good will of ensuring farmers have access to agricultural market information and eventually to markets. Many of these initiatives are projects funded by donors, in most cases development agencies and governments of developed countries. These projects are funded for a specific period, and targeting a defined region or population. In literature, it is not clear whether the projects were initiated by farmers themselves, rather funders or donors are identified. This raises the question of ownership as farmers may feel that they are not part of the project. Again, the progress and functioning of many projects are not reported after the project completion period and withdraw of funding. This raises the question of sustainability of such initiatives. It is not clear how the initiatives are progressing after executing the project and withdraw of funding. Shepherd (1997) reported that most projects were not financially sustainable once donor support was withdrawn.

A good number of literatures are supporting the benefits of providing agricultural market information to farmers. But up to recently literature are yet to assess the real benefits or gain of providing such information to farmers. Literatures are yet to report the real impact of providing agricultural market information to farmers and the reaction of farmer to such service. Access and use of agricultural market information by farmers signal its usefulness but does not ensure its sustainability. It is also not clear whether the agricultural market information received help to link farmers to markets.

But, what are the issues prompting all these initiatives? Most smallholder farmers in Tanzania and in other developing countries live in rural areas and depend on agriculture as their main economic activity. Agriculture provides them (i.e. farmers) with food and through it, they conduct their lives. In short, agriculture is their lives, providing them food and from agriculture they get their all other needs. But as a fact, smallholder farmers in rural areas are poor though they are feeding majorities in towns. When comes the issues of agricultural

marketing, different actors are involved including the farmers themselves, buyers, consumers, traders and their agents (middlemen). The same, the feeling is that agricultural marketing of farm produce has not benefited the farmers, rather other actors. Also, farmers are constrained by some factors in accessing agricultural markets such as poor roads, lack of transports to markets and underdeveloped markets. Uses of ICTs in some rural areas are limited due to poor/no connectivity, lack of electricity and illiteracy.

Because of being unsuccessful in agriculture, smallholder farmers are conducting subsistence farming, producing a little. These farmers have little knowledge of the three factors outline earlier (what to plant, when to plant and where to sell). Usually, their planting decision is based on their experience and not based on experts' advices. Due to poor market access, the smallholder farmers may not cultivate the crops which are highly demanded in the markets. The same, due to poor access to markets and market information, smallholder farmers may sell their farm produce at any market instead of selling to identified markets with good prices based on the information one has. Failure to understand what and when to plant, and lack of market information on where to sell farm produce, all constitute to poor performances in agriculture by smallholder farmers.

Consequences of poor performances in agriculture by smallholders are many. Rural areas may continue to be underdeveloped and thus rural citizens may become dependants. Smallholder farmers and others may fail to invest in agriculture and consider other economic activities. Poor performances in agriculture are translated to low harvests and thus a country may be in danger of hunger. The overall of such poor performance is that the economy of the country is lowered and the country continues to be underdeveloped.

With respect to agricultural marketing, a need raises to empower smallholder famers so that they benefit more from the sales of their farm produce. Good performances of these smallholder farmers in agricultural marketing can encourage more investment in agriculture and perhaps promote modern agricultural practises. Thus, there is a need for further study to investigate how smallholder farmers access agricultural markets and market information while selling their farm produce. The study needs to consider the isolated rural environments, the key constraining factors for the market access and the strategies for making them (i.e. farmers) effective market participants. The ultimatum of all these is to ensure agriculture benefits more the smallholder farmers and boosts the rural development (i.e. markets work for the poor smallholder famers in rural areas) and the development of the nation at large.

1.3. Objectives of the Study

1.3.1. Main Objective

This study aimed at investigating access to agricultural markets and use of market information by smallholder farmers living in rural areas of Tanzania, and engaged in agriculture as their main economic activity. The essence is to improve their access to markets and enhance their use of market information with the intention of enhancing their participation in agricultural marketing of their farm produce. As of this, the study has developed strategies and mechanisms of empowering smallholder farmers in agricultural marketing to ensure they participate fairly in the markets and the markets work for them.

1.3.2. Specific Objectives

The specific objectives were:

(i) To study challenges in accessing agricultural markets and using agricultural market information by smallholder farmers living in rural areas of Tanzania;
(ii) To examine strategies for providing agricultural market information to smallholder farmers sustainably in context of rural areas;
(iii) To develop a framework for linking smallholder farmers to agricultural markets while providing them with access to agricultural market information; and
(iv) To assess and measure the informational capabilities of smallholder farmers in accessing and using agricultural market information.

1.4. Research Questions

To address the objectives, the following research questions were investigated by the study:

(i) What are the challenges facing smallholder farmers in rural Tanzania in accessing agricultural markets and using agricultural market information?
(ii) What are the strategies of providing agricultural market information to smallholder farmers in context of rural Tanzania?
(iii) How can a framework for accessing agricultural market information in rural areas context be developed?
(iv) How can informational capabilities of smallholder farmers in accessing and using agricultural market information be measured?

1.5. Significance of the Study

Linking smallholder farmers to markets is very important for their livelihoods and the development of the agricultural sector. This linkage may involve helping farmers identify markets for their farm produce, buyers of produce, and learn produce demand level in the markets. Thus, with access and use of agricultural market information, smallholder farmers can make best decision regarding their farming activities. The potential advantages of providing agricultural market information to smallholder farmers include: gaining knowledge on how to seek buyers and how to go about marketing their produce; minimizing risks by assurance of the availability of markets for produce; improvement in produce quality, and standardization; protection from being defrauded, and thus, deal with genuine traders and not with marketing agents; and engagement in production of potentially market demanded produce.

Due to its importance, different initiatives and strategies to boot agricultural production in Tanzania, have acknowledged use of agricultural market information. For example, in its National Agricultural Policy, the government of Tanzania has the mission to facilitate the transformation of the agricultural sector into modern, commercial and competitive sector to ensure food security and poverty alleviation through increased volumes of competitive crop products (URT, 2013a). The policy identifies lack of adequate agricultural market information among the factors constraining the agricultural marketing and the agricultural sector in general. In its policy statement, the government promises to strengthen the collection, analysis, storage and dissemination of agricultural marketing data at all levels of markets (*ibid*). Programs and projects established in Tanzania, also acknowledged the use of agricultural market information.

The initiative 'Agricultural Sector Development Programme' (ASDP[2]) targeted poor women and men in the rural districts of the United Republic of Tanzania acknowledged the usefulness of provision of agricultural market information. The objectives of ASDP were to promote private investment based on an improved regulatory and policy environment; and improve farmers' access to and use of agricultural knowledge, technologies, marketing systems and infrastructure, all of which contribute to higher productivity, profitability and farm incomes (URT, 2006).

[2] http://www.ifad.org/operations/pipeline/pf/tan.htm

The second National Strategy for Growth and Reduction of Poverty (NSGRP II or MKUKUTA II in its Kiswahili acronym) was a continuation of the government and national commitments to accelerating economic growth and fighting poverty (URT, 2010). Among its operational targets, was agricultural growth to increase in real terms by 6.0 per cent from 2009 to 2015. Among the strategies of NSGRP II was to introduce and strengthen investments in agriculture, including mechanization, farm level ago-processing, and physical market infrastructure (market places). The second National Strategy for Growth and Reduction of Poverty also has the strategies of promoting and adopting the use of science and technology in production of quality and high value cash crops, as well as use of ICTs to provide information on prices, markets, and advisory services (URT, 2010).

A public-private partnership, Southern Agricultural Growth Corridor of Tanzania (SAGCOT), was initiated at the World Economic Forum Africa summit in May 2010 intended to improve the incomes, employment opportunities and food security of smallholder farmers in southern Tanzania by linking them to internationally competitive supply chains and accelerating commercial agricultural development, in particular by using foreign direct investment attracted by the removal of policy and infrastructural constraints to competitiveness and by facilitated access to land (URT, 2013b). The Southern Agricultural Growth Corridor of Tanzania initiative aimed to bring 350 000 Hectare of land into commercial production, increase annual farming revenues by US$1.2 billion, and lift some 450 000 farming households out of poverty in 20 years (URT, 2013b).

A Private-Public Initiative, KILIMO KWANZA (KK), adopted in 2009 was aimed at modernizing and commercializing agriculture thereby increasing agricultural output and strengthening food security in Tanzania (Lugoe, 2010). The strategy recommended that the resolution for agricultural transformation be undertaken by small, medium and large-scale producers. Among its pillars, KK proposed to establish industries to provide backward and forward linkages for the agricultural sector and increase access to local and foreign markets for value added products (Lugoe, 2010).

Though initiatives of providing agricultural market information to farmers in the above programs were mentioned, it is not clear whether such initiatives were implemented or not. Literature or reports have not reported the progress of such initiatives or evaluation of their impacts. These programs did not also put forward strategies for implementing such initiatives of providing agricultural market information to farmers. This study adds on by describing

strategies of providing agricultural market information to small scale farmers after thorough analyses of factors obstructing their access to markets and use of agricultural market information. To make small scale farmers active market participants, the study proposed to build their capabilities by developing a framework that can link farmers to markets while providing them with agricultural market information for their produce.

The above mentioned programs and others to be implemented in the future can benefit by the findings of this study in many ways. They can understand the challenges of accessing agricultural market information by rural farmers and develop intervention strategies in their policies. These programs also can use the findings of this study to ensure farmers have access to agricultural market information and are linked to markets. Sustainability of the provision of agricultural market information is also important, especially after the completion of the program/project. Thus, through this study, development programs can set up strategies to ensure the sustainability of provision of agricultural market information even after project/program completion period.

1.6. Basic Concepts

Agricultural marketing and marketing in general, involves several concepts among which are market information, marketing information, marketing information system, agricultural market information services and smallholder farmers. For the purpose of this study, the following terms and their descriptions/definitions were adopted:

1.6.1. Market information

In its basic form, Market Information can be defined as commodity price data linked with market demand condition (Ferris *et al*., 2008). The regular dissemination of market information can assist farmers to monitor market conditions, make better decisions on what and where to sell produce, and negotiate for improved prices with traders.

1.6.2. Marketing Information

Concept which is likely to include details on potential market channels, payment requirements, packaging, quality and a whole host of information required by a producer to make a successful sale, including market information (Shepherd, 1997). Such information can be used to plan for future marketing or product development activities.

1.6.3. Marketing Information System

Marketing Information System, or sometimes market intelligence system, is a set structure of procedures and methods for the regular, planned collection, analysis and presentation of information for use in making marketing decisions (Kotler *et al.,* 2006). Timely market information provides basis for monitoring and estimating emerging market trends.

1.6.4. Agricultural Market Information Service

Agricultural Market Information Service (AMIS), or sometimes Market Information Services (MIS) is a service, usually operated by the public sector, which involves the collection on a regular basis of information on prices and, in some cases, quantities of widely traded agricultural products from rural assembly markets, wholesale and retail markets, as appropriate, and dissemination of this information on a timely and regular basis through various media to farmers, traders, government officials, policy makers and others, including consumers (Shepherd, 1997).

1.6.5. Smallholder Farmers

Smallholder farmers are defined as those farmers owning small-based plots of land on which they grow subsistence crops and one or two cash crops relying almost exclusively on family labour (DAFF, 2012). The characteristics of their agricultural production systems are of simple, out-dated technologies, with low returns, and limited access to markets. Often the term ‘smallholder’ is interchangeably used with ‘small-scale’, ‘resource poor’ and sometimes ‘peasant farmer' (DAFF, 2012).

1.6.6. Rural area

The description of rural areas is well captured in a report on Rural Development Strategy in Tanzania by URT (2001). The report describes rural development as concerned with geographical areas in which primary production takes place and where populations are found in varying densities. These areas are characterised by activities related to primary and secondary processing, marketing and services that serve rural and urban populations. Therefore, rural development concerns a wide range of farm and non-farm activities. In order to achieve rural development the linkage between rural and close by small towns and urban centres is crucial. For operationalization of the Rural Development Strategy, therefore rural

areas include villages and small towns/nearby urban centres.

1.7. Summary

This chapter has contextualised the research study. It briefly introduced the background information regarding the problem of accessing and using agricultural market information by smallholder farmers in developing countries. The study clearly presented the rationale of the research and the statement of the problem i.e. provision of access to agricultural markets and of using agricultural market information by smallholder farmers in isolated rural areas. Further, the study objectives were outlined while defining research questions to allow a systematic investigation of the study. Lastly, the chapter presented the significance of the study. The rest of the chapters are organized as follows:

(i) Chapter Two discusses the Research Design and Methodologies;

(ii) Chapter Three discusses the agricultural market information services in African developing countries context;

(iii) Chapter Four discusses accesses, challenges and status of agricultural market information in Tanzania rural context;

(iv) Chapter Five is concerned with development of a framework for accessing agricultural market information;

(v) Chapter Six discusses the assessment and measurement of informational capabilities of smallholder farmers accessing and using agricultural market information; and

(vi) Chapter Seven discusses and concludes the study while providing recommendation.

CHAPTER TWO

RESEARCH DESIGN AND METHODOLOGY

2.1. Introduction

To undertake a scientific study, research design and methodologies need to fit together in a meaningful whole. To achieve this goal, the researcher needs to draw up a design of strategies for conducting the study or the plan to obtain answers to the research questions (Sharma, 2014). Burns and Grove (2010) describe the research design as a "blueprint for conducting a study", Parahoo (2014) describes a research design as "a plan that describes how, when and where data are to be collected and analysed", while Polit and Beck (2004) define a research design as "the researcher's overall for answering the research questions". Among others, the research design includes the research approach, the population to be studied, sources of data, tools and methods of data collection and methods of data analysis (Sharma, 2014). Thus, the research design (a) guides the researcher in planning and implementing the study to achieve the intended goals, and (b) provides control to increase the probability of producing study results that are accurate reflections of the real situations.

This chapter describes the overall design of the research with focus on research approach, process, methods and analysis. It details how the study is designed, data collected and analyses made. The chapter will attempt to answer the four questions posed by Crotty (1998) by providing the ontology and epistemology of the study, research methodology and methods.

This study is considered applying ICTs to link smallholder farmers to markets and providing them with agricultural market information. Usually, information systems (ISs) are involved in such (or any) provision of information. According to Hevner *et al.* (2004), for an IS to achieve its stated purpose, namely improving the effectiveness and efficiency of an organization, interactions among people, technology, and organizations must be managed. Much researches in IS domain are multi-disciplinary, with much literatures focusing on its contribution to development (Hedström and Grönlund, 2008; Raiti, 2006).

Researches can be classified as either scientific or interpretive (Galliers, 1992). Scientific approach assumes that phenomenon can be observed objectively and rigorously; good research is legitimated with reference to the virtues of repeatability, reductionism and

refutability (Checkland, 1981). Scientific research requires originality and creative thoughts, and is very sensitive to the psychological state of the scientist (Wilson, 1990). Interpretive studies generally attempt to understand phenomena through the meanings that people assign to them (Orlikowski and Baroudi, 1991). The aim of interpretive research is to find new interpretations or underlying meanings and adheres to the ontological assumption of multiples realities, which are time-and context dependent (De Villiers, 2005). Interpretive research assumes that reality is socially constructed and the researcher becomes the vehicle by which this reality is revealed (Walsham, 1995). This approach is consistent with the construction of the social world characterised by interaction between the researcher and the participants (Mingers, 2001). The researcher's interpretations play a key role in this kind of study bringing "such subjectivity to the fore, backed with quality arguments rather than statistical exactness" (Garcia and Quek, 1997). Braa and Vidgen (1997) characterized the two views of research as science, which is concerned with reducing the area of investigation to be able to make reliable predictions, and interpretivism, which is concerned with making a reading of history to gain understanding. In both scientific and interpretivist approaches, the researcher is making an intervention and can therefore affect the organizational context insofar as there may be unintended consequences of purposeful human activity (Giddens, 1984).

From the interpretive research perspective, this study has adopted the Design Science Research (DSR) approach with key focus to knowledge contribution by increasing the understanding of the phenomenon. The researcher has strived to attain an understandable and sincere account of the analysed phenomenon by providing its meaning and intentional descriptions. The research is considered qualitative as the researcher has investigated a problem in rural societies and the research findings have been complemented with quantitative techniques. The choice of the qualitative approach is based on three factors (a) the research problem, (b) the researcher's theoretical lens, and (c) the degree of uncertainty surrounding the phenomenon; as proposed by Trauth (2001). The nature of the research problem should be the most significant influence on the choice of a research methodology; the second important influence on the choice of research method is the theoretical lens that is used to frame the investigation; and lastly, certain contingencies of the problem - such as degree of uncertainty surrounding the topic need to be considered (Trauth, 2001). By theoretical lens, Trauth (2001) is referring to philosophical issues of ontology and epistemology. For researchers, the starting point is to identify one's philosophical

assumptions leading to a choice of an appropriate methodology.

The ontology of the research is adopted from a study by Babüroglu and Ravn (1992). Babüroglu and Ravn (1992) explained that social reality is constructed through human activities in an environment where technology is socially embedded. Ontologically, the social world is produced and reinforced by humans through their actions and interactions (Orlikowski and Baroudi, 1991). With ontology, there are beliefs about social relations, about how people interact in organizations, groups, and societies (Orlikowski and Baroudi, 1991). The epistemology of this research is that knowledge is created by individuals, an organization cannot create knowledge without individuals but the organization supports creative individuals or provides a context for such individuals to create knowledge (Nonaka, 1994). With this, the ontological position underpins the epistemological position, and thus the research findings are literally created as the research investigation proceeds.

Both the ontological and epistemological positions of this research is supported by Braa and Vidgen (1999) study on IS Research framework for the organizational laboratory. Braa and Vidgen (1999) represented the IS research framework with a triangle comprising points, sides, and a constrained space (Fig. 1). Based on this framework, this research can be positioned at the understanding/change side of the triangle. With this, the researcher becomes an observer who can make interpretations (understanding) of technologically enabled society and as a researcher involved in unreflective practice (change) within the society (Braa and Vidgen, 1997). Interpretations that are successful bring out insider rationality and promote understanding (Braa and Vidgen, 1999).

2.2. Design Science Research: Methodologies

According to Hevner *et al.* (2004), DSR is fundamentally problem-solving paradigm. The approach works on understanding the problem and attempts to find the strategies for solving such a problem. In finding solutions to problems, DSR creates or contributes to new and interesting design science knowledge in an area of interest (Vaishnavi and Kuechler, 2004). Such knowledge of an area eventually includes theory along with artefacts (Vaishnavi and Kuechler, 2004). Hevner *et al.* (2004) defined artefacts as constructs (vocabulary and symbols), models (abstractions and representations), methods (algorithms and practices), and instantiations (implemented and prototype systems). Denning (1997) described artefacts as innovations that define the ideas, practices, technical capabilities, and products through which

the analysis, design, implementation, and use of information systems can be effectively and efficiently accomplished. Innovations produced by DSR are intended to solve problems facing the society in real world and make contributions to the theory of the discipline in which it is applied (Lukka, 2003). From the design science perspective, the main purpose of the research is to develop valid knowledge to support societal problem solving (Saunders *et al.*, 2011). Such support can be direct, instrumental or indirect through general enlightenment on the type of problem at hand. The mission of a DSR is to develop knowledge that the professionals of the discipline in question can use to design solutions for their field problems (Van Aken, 2005). DSR is also concerned with knowledge to be used in designing solutions, followed by design-based action (Van Aken, 2005).

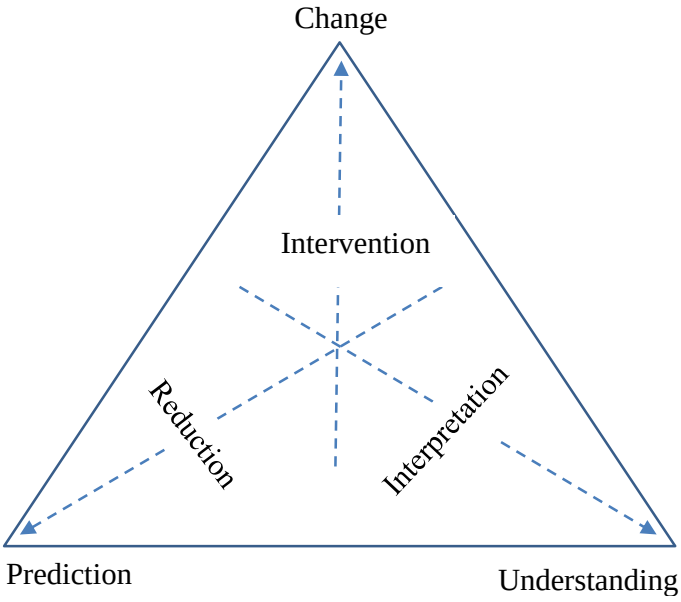


Figure 1: Braa and Vidgen (1999) IS Research Framework

The goal of DSR is problem-solving and the outcome is to design a theory or artefact shown to have utility (Baskerville *et al.*, 2009). Artefacts are characterized by practical utility while adding to the scientific body of knowledge. To ensure practical utility, the researcher must be aware of a variety of knowledge sources in the conduct of the research. Hevner *et al.* (2004) paused two fundamental questions of DSR: (a) "What utility does the new artefact provide?" and (b) "What demonstrates that utility?". Hevner *et al.* (2004) stressed that evidence must be presented to address the two questions and that contribution arises from utility. With this respect, utility is the outcome of the initiative to find the solution to the identified problem which ranges from simple solution to the isolated problems to complex effect such as intervention in a complex situation. For example, in this study the utility is the resultant benefits of access to agricultural market information by small scale rural farmers in terms of

potential expansion of human capabilities which have both direct and indirect importance in the achievement of development.

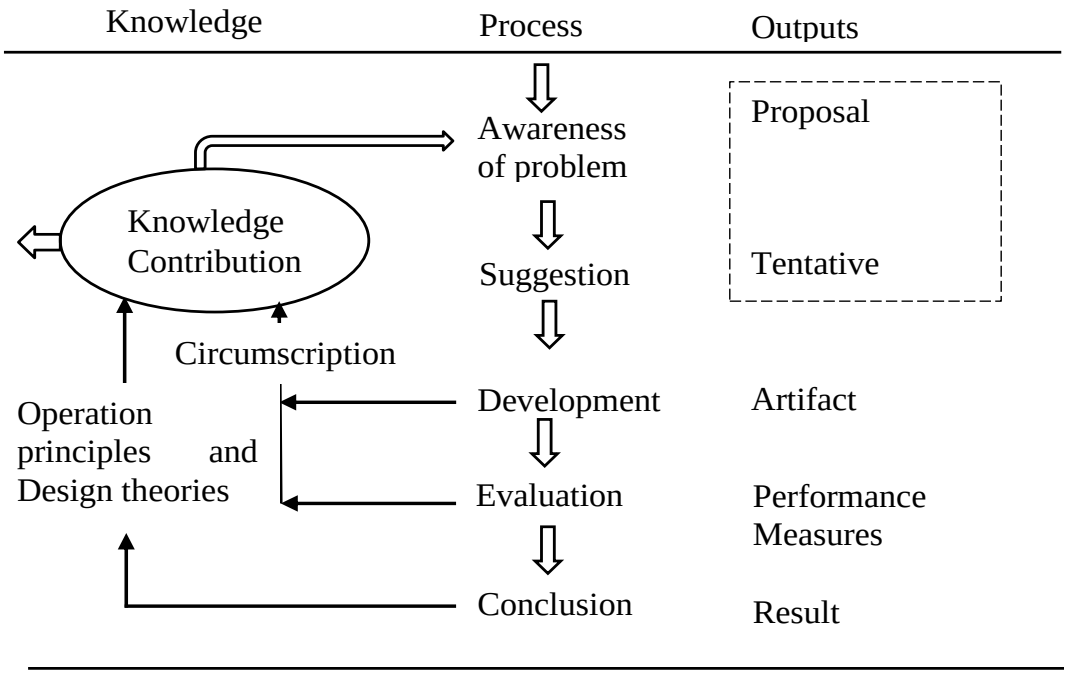


Figure 2: Design Science Research Methodology (Vaishnavi and Kuechler, 2004)

As hinted earlier, artefacts include:

(i) Constructs (vocabulary and symbols),

(ii) Models (abstractions and representations),

(iii) Methods (Algorithms and practices),

(iv) Instantiations (implemented or prototype systems), and

(v) New and better theories (Hevner *et al.*, 2004; March and Smith, 1995; Venable, 2006b)

The artefact also may include social innovations (van Aken, 2004) or new properties of technical, social, and/or informational resources (Järvinen, 2007). Scholars such as Hevner *et al.* (2004) agree that designing the solution to the DSR problem is a complex process which needs creative advances due to limitations in existing theories. Venable (2006a) insisted that DRS can be used as a theory building method. The role of theories in DSR is to predict or explain phenomena that occur with respect to the artefact's use (intention to use), perceived usefulness, and impact on individuals and organizations (net benefits) depending on system, service, and information quality (Hevner *et al.*, 2004). Järvinen (2007) explained that suggestions for a problem solution are abductively drawn from existing knowledge/theory base for the problem area. Peffers *et al.* (2007) suggested that the development of the artefact

should be a search process that draws from existing theories and knowledge to come up with a solution to a defined problem. Thus, both existing and new theories can help in evaluating and validating the artefact.

In this research, a framework was developed based on the theories and concepts of capability approach to ensure market systems work for the isolated poor smallholder farmers living in rural areas practicing subsistence farming. The framework provides opportunities for developers of information systems to build agricultural market information systems that can cater for rural areas using different access strategies. Using existing agricultural market information system, a case study of assessing and measuring informational capabilities of smallholder farmers was conducted. The problem specification, design of the framework based on the capability approach, use of a case study of identified AMIS to measure informational capabilities of smallholder famers has typically demonstrated the structured representation of DSR.

2.3. Fitting the Study in Design Science Research

The approach of DSR has been studied by different scholars (Hevner *et al.*, 2004; March and Smith, 1995; Peffers *et al.*, 2007). A synthesis study by Peffers *et al*. (2006) identified that DSR consists of six (6) activities namely (a) problem identification and motivation, (b) objectives of a solution, (c) and development, (d) demonstration, (e) evaluation, and (f) communication. Another study by Hevner *et al.* (2004) derived seven (7) guidelines of design-science research based on the fundamental principle that knowledge and understanding of a design problem and its solution are acquired in the building and application of an artefact. This research has adopted the general methodology (Fig. 2) for design science research as put forward by Vaishnavi and Kuechler (2004) which is an adaptation of the computable design process model developed by Takeda *et al*. (1990). Vaishnavi and Kuechler (2004) interpreted the research process model shown in Fig. 2 as an elaboration of both the Knowledge using Process and the Knowledge Discovery Process. Vaishnavi and Kuechler (2004) admitted that their model is like other models, however, its emphasis is on a detailed process for generating design science knowledge.

The following sections discuss the processes of the adopted DSR methodology and the different phases of this research study.

2.3.1. Awareness of Problem

Awareness of the problem comes from multiple sources and may invoke a formal or informal solution to the identified problem. The research considered this phase as a situational analysis that investigates the nature and scope of the problem and challenges available in accessing agricultural market information by isolated rural farmers in Tanzania. The curiosity of the research lies in the social reality that for long time, rural farmers have been practicing subsistence farming and their efforts to move to profitable agriculture is hindered by some factors including poor access to agricultural markets and lack of agricultural market information. The introduction chapter i.e. Chapter One, of this study gives the background of the problem and the study objectives. To get clear insight of the awareness of the problem, reading in allied discipline of agricultural market information services was also carried out. This reading produced a paper (Magesa *et al.*, 2014b) with focus in developing countries, focusing on nature of agricultural markets, access to and use of agricultural market information and challenges in agricultural market information services. The research also conducted another study (Magesa *et al.*, 2014a) narrowing the focus to identified rural districts in Tanzania to get a real situation of the nature of agricultural markets, status and challenges available to access agricultural market information and means of accessing and providing agricultural market information. All these helped to identify the problem domain and subsequently narrow down the focus of the research to the relevant field. In all cases, the focus of the study was to design a framework to facilitate access to agricultural markets and market information by rural farmers.

2.3.2. Suggestion

Suggestion is essentially a creative step wherein new functionality is envisioned based on a novel configuration of either existing or new and existing elements (Vaishnavi and Kuechler, 2004). A thorough study on the "awareness of the problem" led to the suggestion of developing mechanisms for empowering small-scale farmers in agricultural marketing. The issue is that, markets should be fair to all market participants and should also work for small-scale farmers. The suggestion phase dealt with investigating two (2) issues pertaining to access of agricultural market information: (a) access to markets and (b) means of - and access to - agricultural market information. The second publication of this study investigated issues of market access in identified rural areas in Tanzania (Magesa *et al.*, 2014a). The publication also investigated access and use of agricultural market information among rural farmers in

selected districts. Lastly, the publication investigated media available in accessing, storing and disseminating agricultural market information among the rural farmers. The investigations formed a basis for suggesting a novel configuration and feasible design of a framework for accessing agricultural market information among rural farmers.

2.3.3. Development

With this phase, usually an artefact is suitable for demonstrating the concepts and theories suggested or claimed in the research. In this phase, Tentative Design is further developed and implemented. The implementation techniques vary depending on the artefact to be created (Vaishnavi and Kuechler, 2004). With this, the framework for accessing agricultural markets and market information by rural farmers was developed based on the capability approach and concepts. The framework included resources or agencies required to build capabilities of small-scale farmers in their empowerment process, and the structures that are involved, the degrees of empowerment and the development outcomes.

2.3.4. Evaluation

Evaluation phase involved validating the developed framework for accessing agricultural markets and market information by assessing and measuring the informational capabilities of smallholder farmers who have accessed and used the identified AMIS. The main purpose of measuring informational capabilities was to demonstrate how technology, specifically ICTs, can develop the capabilities of smallholder farmers in agricultural marketing and thus enhance their participation in the agricultural value chain. The overall, is to ensure smallholder farmers are empowered in agricultural marketing to become active participants.

2.3.5. Conclusion

This phase can be regarded as the end of the research cycle or the finale of a specific research effort (Vaishnavi and Kuechler, 2004). In this final phase of DSR, the research findings are presented to the relevant audiences in a clear manner. Communication of the conclusion to other researchers and practitioners is very important (Hevner *et al.*, 2004). This phase of research provides results which show the degree to which the solution satisfies the needs of the target users and the targeted situation that is intended to be improved. As a conclusion of research effort, the phase needs to indicate its knowledge contributions, and recommend areas of interest for further studies. In this study, findings were prepared and presented at various

journals targeting international audiences (Magesa *et al.* 2014a; 2014b). The last chapter i.e. Chapter Seven, summarizes the study, presents the study contributions and recommends the areas of research in future.

2.4. Research Process

Basically, a research process provides a framework for the guidance to explore the research. It helps the researcher to understand the direction to go on to do their own building as they move towards understanding and expounding the research (Crotty, 1998). Among others, the research process helps the researcher to understand the techniques or procedures used to gather and analyse data related to some research questions or hypotheses (methods) and the strategy, plan of action, process or design lying behind the choice and use of methods and linking the choice and use of methods to the desired outcomes (methodology) (Crotty, 1998).

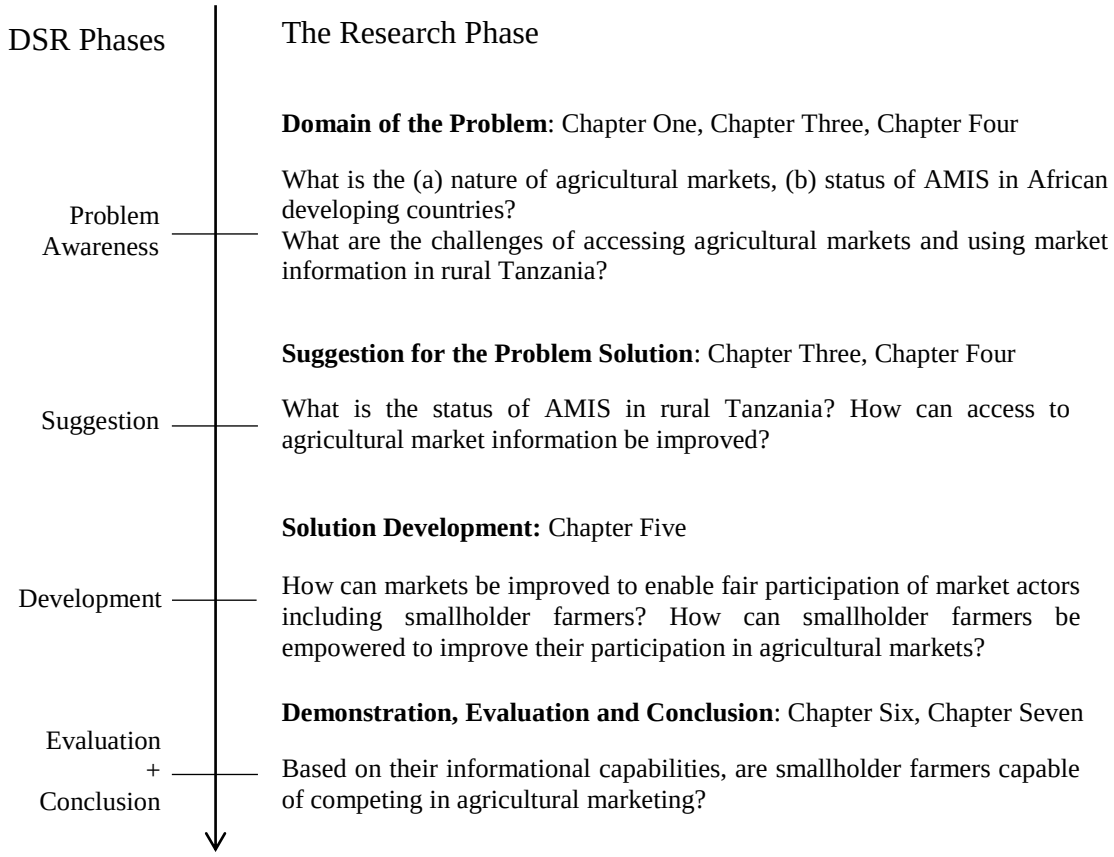


Figure 3: Design of the research according to DSR

Fig. 3 summarizes where the chapters are placed in DSR phases in the research process. Under the Problem Awareness phase, Chapter One, Chapter Three and Chapter Four are involved. Chapter One has introduced the statement of the problem, Chapter Three has looked the problem at the context of African developing countries, while Chapter Four has

investigated the problem at the context of Tanzania. Both Chapter Three and Chapter Four have suggested the solution to the identified problem in the previous phase. The development phase involved Chapter Five in which the framework for accessing agricultural markets and market information was developed based on the capability approach. Chapter Six was concerned with assessing and measuring the informational capabilities of smallholder farmers. The last chapter i.e. Chapter Seven concluded the research by giving the conclusions and recommendations.

Further, for some activities in Fig. 3 to be accomplished, a well thought methodologies and methods were adopted. Table 1 summarizes the methodologies and methods used to accomplish the identified activities (sub-questions).

2.5. Research Methods

Table 1 shows the methods the researcher used in performing research operations. Research methods include methods which are concerned with the collection of data as well as those statistical techniques which are used for establishing relationships between the data and the unknowns (Kothari, 2004). Table 1 also shows that different methods and techniques (i.e. multiple or mixed methods) were employed during the research process. Johnson and Onwuegbuzie (2004) described mixed research method as a class of research where the researcher mixes or combines quantitative and qualitative research techniques, methods, approaches, concepts or language into a single study or set of related studies. Mixed research methods are still debatable (Becker and Niehaves, 2007), but Gable (1994) argued that mixed research methods increases the robustness of results, enhances research findings through the cross-validation achieved when different types and sources of data embedded and are found to be congruent or when explanations are developed to account for divergence.

Broadly, this study was conducted as a case study. A case study is an appropriate method for investigating phenomena when there is a shortage of participants (Olivier, 2009) and it is not intended as a study of the entire population, rather is intended to focus on an issue, feature or unit of analysis (Noor, 2008). Though case studies are useful when developing theories in social sciences (Yin, 2009), it was considered in this research because the study depended on human evaluation judgment which is prone to subjectivity. According to Yin (2009), one can consider a case study design when: (a) the focus of the study is to answer “how” and “why” questions; (b) the behaviour of those involved in the study cannot be manipulated; (c) one

wants to cover contextual conditions because there is a belief that they are relevant to the phenomenon under study; and (d) the boundaries are not clear between the phenomenon and context.

Table 1: Research methods and techniques

SNo	Study	Methods/Techniques
(a)	A study on AMIS in African developing countries	Reports and Literature survey and review with focus to African developing countries
(b)	A study on access of agricultural market information in rural Tanzania	Data collection – field visits and Survey, observation, interview, and use of questionnaires Data analysis – Use of Descriptive Statistics - Grouping of data based on identified categories and calculating the percentages of frequencies - Tallying of responses
(c)	Framework development	Reports and Literature review, Adoption of Capability approach, a Review on other existing frameworks, Concept mapping – mapping challenges to components/items of the identified frameworks
(d)	Measuring informational Capabilities of smallholder farmers	Conducted as a case study Data Collection – Use of questionnaires Data Analysis - Regression analysis - ordinary least squares (OLS) - Regression analysis - Backward elimination to eliminate insignificant variables, and introducing control variables, Ordered logit Model

Case studies have been criticized for being of less value, impossible to generalize from, and being biased (Noor, 2008; Runeson and Höst, 2009). On responding to critiques of case studies, Runeson and Höst (2009) noted that generalizability can be met by applying proper research methodology practices as well as reconsidering that knowledge is more than statistical significance. Yin (2009) contended that case studies, like 'case experiments', are generalizable to theoretical propositions and not to populations or universe and that the goal is to expand and generalize theories (analytical generalizability) and not to enumerate frequencies (statistical generalizability). Noor (2008) added that result of findings using multiple cases can lead to some form of replication.

As a case study, this research explored the status and challenges of access to agricultural market information in African developing countries and later, the study narrowed down the context to rural Tanzania. In a course of the study, the framework was developed to facilitate

access to agricultural markets by rural farmers and to enhance their use of market information. Later the study, through a case study, assessed and measured the informational capabilities of smallholder farmers based on their experience of using the identified AMIS program. This case study involved collection and analysis of data from the identified sources using the methods addressed in Table 1. The following sections discuss the methods used for data collection and analysis during this study.

2.5.1. Literature Survey

The purposes of conducting literature survey are: (a) to identify gaps in the literature (b) to avoid reinventing the wheel (c) to carry on from where others have already reached (d) to identify other people working in the same fields and (e) to increase the researcher's breadth of knowledge of his subject area (Randolph, 2009). On conducting a literature search, Webster and Watson (2002) recommended that one should use a systematic search and ensure that s/he accumulates a relatively complete census of relevant literature. One can gauge that his review is nearing completion when s/he is not finding new concepts in his/her article set. As part of this study an extensive literature review was conducted to produce the following publication:

Magesa, M. M., Michael, K. and Ko, J., (2014b), Agricultural Market Information Services in Developing Countries: A Review. *Advances in Computer Science: an International Journal*, **3 (**3), 38-47.

This article presents the historical background of AMIS in african developing countries, nature of markets, recent AMIS and their status in developing countries, and the missing links and future prospects of AMIS in developing countries.

Again, each chapter is accompanied by a literature review focusing on the subject matter under consideration. The best source of literature is the Internet where searches are conducted using the Google search engine. The limitation of online literature is that some articles are available to prescribed members or upon payments. Other sources of literature are the library references and available documents such as academic journals, conference proceedings, government reports, and books. Development of a framework and measurement of informational capabilities were based on extensive literature review, online visits to identified AMIS and use of findings from other studies.

2.5.2. Survey Research Method

Survey is a means of gathering information about the characteristics, actions, or opinions of a group of people, referred to as a population (Tanur, 1982). The purpose of survey is to produce quantitative descriptions of some aspects of the study population and may be primarily concerned either with relationships between variables, or with projecting findings descriptively to a predefined population (Glock and Bennett, 1967). The subjects studied might be individuals, groups, organizations or communities and the main way of collecting information is by asking people structured and predefined questions (Pinsonneault and Kraemer, 1993). Their answers, which might refer to themselves or some other unit of analysis, constitute the data to be analysed (Pinsonneault and Kraemer, 1993).

Table 2: Field surveys, techniques and data analysis during the research

Study	Techniques	Data analysis
A study on access of agricultural market information in rural Tanzania	Observation, unstructured interview, questionnaire	(a) Measure of central tendency and frequency to learn: – Knowledge on status of ICT usage in the identified areas – Challenges in accessing agricultural market information – Constraining factors in access to information (b) Tallying of responses
Measurement of informational capabilities	Questionnaire	(a) Regression analysis using ordinary least squares to establish significance of the variables (capability indicators) (b) Regression analysis (using backward elimination method) to remove insignificant variables and introducing control variables (c) ordinary least squares + ordered logit model to compare results of sub-samples based on gender and age

During the course of this research, two surveys were conducted each with a different objective and focus. The two surveys were conducted in different areas and thus respondents were drawn from different populations. Table 2 summarizes the techniques for data collection and data analysis employed during the different phases of the research. It can be seen that questionnaires were mostly used for collecting data. The questionnaires were translated to 'Swahili' language for ease of understanding by respondents. Sometimes during the field survey, the researcher wanted to crosscheck the responses from the respondents to ensure they provided correct and fair responses. In this case, the researcher employed observation and unstructured interview.

The techniques of observation and interview have some advantages. They allow a researcher

to learn, understand and interpret many qualitative aspects found in the study area. But caution was taken to ensure that such techniques do not lead to subjectivity. The details of how each method and technique were employed in the research, are presented in the respective chapter.

2.6. Summary

The credibility of the research findings is an important aspect of any research success and is influenced with the appropriate selection of research design and methodology. Research methodology is the overall approach to be used in the research process from the theoretical groundwork to the collection and analysis of the data. In this context, Chapter Three has presented and justified the research design and methodology adopted for this research study in developing conceptual solutions that meet the needs of the problems identified in the domain. In doing so, this chapter has presented the process involved in the theoretical groundwork related to the adoption of the research study, method and techniques for data collection and analysis as well as for designing and evaluating the proposed solution. Although the research methodology is not the only suitable design for similar research undertaken, it has been deemed as most suitable in view of the aim, objectives and questions of the research at hand.

The next chapter, i.e. Chapter Three, will critically review and discuss the literature related to the study on agricultural market information services in African developing countries. This is a problem investigation carried on for clarifying and grasping the real situation of AMIS in African developing countries. Therefore, Chapter Three will provide an insight into understanding the focus of the research into large context and for ensuring the research moves towards the right direction.

CHAPTER THREE

AGRICULTURAL MARKET INFORMATION SERVICES IN DEVELOPING COUNTRIES: A REVIEW

ABSTRACT

Access to agricultural markets and use of agricultural marketing information are essential factors in promoting competitive markets and improving agricultural sector development. This is because in Sub-Sahara developing countries, agricultural sector employs majorities and hence contributes greatly to the development of the individual and the countries at large. Agriculture is mostly practised by smallholder farmers living in isolated rural areas with poor access to agricultural markets and deprived of agricultural market information, and thus receive lower prices for their agricultural produce. This study conducted a literature review on status and use of AMIS in Sub-Sahara developing countries. Findings reveal that ICT is being adopted and that initiatives are in place in some countries to ensure use of AMIS in accessing agricultural market information. It is not clear whether technology used for providing agricultural market information is appropriate and useful to rural farmers. Also, the sustainability of providing agricultural market information in not clear due to lack of clear business model. It is recommended to use easily accessible technology and involve local citizens in provisions of agricultural market information.

3.1. Introduction

Developing countries place emphasis upon investing in agriculture as it is the sector that holds the most promise for pro-poor economic growth. Majorities of the poor live in rural areas where agriculture is the mainstay of their living and smallholder farming dominates agricultural production, and a large proportion is for subsistence (Adam *et al.*, 2012; Aker, 2010; Eskola, 2005). Improved agriculture has a direct impact on rural growth by improving rural income, their livelihoods and even increasing government revenue. Agriculture in developing countries is a larger contributor to growth domestic product (GDP) and foreign exchange (Aina, 2007; Aker, 2010) and generates export earnings, labour, capital and domestic demand to support growth in other sectors. Agriculture plays a key role in ensuring national food security (Rao, 2007). Overall, improved agricultural productivity is the principal route to reducing poverty, especially in rural areas and improving livelihoods in developing countries.

Despite all efforts, agriculture is yet to benefit rural smallholder farmers in developing countries. Several factors are attributed to this failure. Some failure factors include a long and discontinuous supply chain, inadequate policy support, limited infrastructure for storage, transportation and marketing of agricultural produce, limited opportunities for value addition, and inefficient information and knowledge flows (Rao, 2007). Pokhrel and Thapa (2007) associated this failure with fragmented and imperfect marketing situations in non-competitive situation of price formation and policy matters. Devaux *et al.* (2009) and Kruijssen *et al.* (2009) noted that small scale farmers in developing countries are often disadvantaged as they have limited access to physical and financial resources restricting their ability to expand and invest in technologies that increase efficiency and add value to primary production. Small scale farmers have limited technical skills and poor access to information and training for improving their production practices and also lack bargaining power (Kruijssen *et al.*, 2009). Scholars like Dorward *et al.* (2004) stressed the importance of linking smallholder farmers to markets as this will lead to increased incomes and food security, more rural employment, and sustained agricultural growth.

To thrive in global economy, scholars have proposed different mechanisms of empowering rural smallholder farmers. Hellin *et al.* (2009) encouraged smallholder farmers to create an entrepreneurial culture in rural communities by shifting the focus from production-related programs to more market-oriented interventions. This stresses the formation of community-based organizations, whereby smallholders can pool resources and market their products collectively, could overcome the high transaction costs resulting from their small size (Barham and Chitemi, 2009; Kruijssen *et al.*, 2009). Collective actions through farmers' organizations enhance market performance through improved access to important resources such as inputs, credit, transport and knowledge and information sharing. This initiative also improves the bargaining power of farmers and reduces the risks individual farmer may encounter.

Other researchers have associated the low returns of agriculture produce to smallholder farmers to lack of market access and the marketing information (Eskola, 2005; Kindness and Gordon, 2001; Lightfoot and Scheuermeier, 2007; Roy, 2012). Poor transportation infrastructure like unpaved roads may limit the distance farmers travel to market their produce. Size of produce (small) may discourage farmers to travel to distant markets to search for better price. Farmers may also be paid a little due to lack of marketing information

such as demands and produce price at different distant markets. This has resulted in introduction of middlemen or intermediaries who are better equipped with marketing information. The roles of intermediaries in providing marketing services particularly to small farmers have not been received positively by many. They are perceived as parasites who exploit small farmers by taking away a large share of the benefit accrued from the sale of crops by taking advantage of smallholder farmers' unawareness of market prices. Intermediaries cheat farmers by taking advantage of their lack of knowledge of market prices, poverty and weak bargaining power arising from illiteracy and low social status, on the one side, and monopsony or oligopsony types of marketing system, on the other (Lightfoot and Scheuermeier, 2007). Roy (2012) noted that intermediaries often flout market norms and their pricing lacks transparency and thus their presence reduces the returns of farmers substantially. Roy (2012) proposed to improve the marketing system to enable smallholder farmers to benefit more from their produce. Marketing information helps farmers and traders plan their marketing strategy and in bargaining with other parties (Kleih *et al.*, 2006). Reliable market information may also help farmers to decide on where to sell, when to sell, who to sell to and to plan their production (Ferris and Robbins, 2004; Kindness and Gordon, 2001; Kleih *et al.*, 2006). More importantly, farmers may be aware of the types and quality of produce being sought by national, regional, and international customers that may aid the nation to earn more from exports (Ferris and Robbins, 2004).

3.2. Historical Background of AMIS in Developing Countries

Agricultural marketing in most developing countries historically trace back in 1980s where governments controlled and regulated the major export and strategic food commodities and inputs (Kherallah *et al.*, 2000). There was a common view that private traders were exploitative and that markets could not be trusted with the critical task of feeding the nation (Kherallah *et al.*, 2010). Monopoly and semi-monopoly marketing parastatals were created for handling marketing of agricultural products. Agricultural markets were regulated via input price controls and subsidies, oligopolistic input markets, monopolistic produce marketing boards, pan-seasonal and pan-territorial administrative commodity pricing, oligopolistic processing industries, and fixed wholesale and retail prices (Barrett and Mutambatsere, 2005). Government enterprises were given the responsibility of organizing food markets and fixing nationwide prices for farmers and consumers, managing export crop production by providing inputs on credit, fixing their prices, and monopolizing the processing and export of

the crops (Kherallah *et al.*, 2010; Kilima *et al.*, 2008; Mbiha *et al.*, 2001). Commodity prices were generally set below market levels, implicitly taxing producers while subsidizing consumers (Barrett and Mutambatsere, 2005).

Evaluation studies have proved that the government controlled markets could not perform as expected. Farmers were exploited due to low prices offered to them after taxes and high costs the enterprises incurred and delayed payments (Kherallah *et al.*, 2010; Pokhrel and Thapa, 2007). Marketing channels were typically very inefficient, with centralized storage and processing facilities (Barrett and Mutambatsere, 2005). They could not provide any services to majority of the farmers who possessed small landholdings and produce crops beyond the mandate of marketing parastatals (Dorward *et al.*, 2004). Government intervention strategy aggravated farmers' problems instead of helping them to bargain for better prices for their produce. Moreover, larger crop producers became the main beneficiaries instead of the target groups of small producers (Lantican, 1997). Due to the failure of interventionist policies, there emerged parallel or black markets and cross-border smuggling in many African developing countries (Barrett and Mutambatsere, 2005; Kherallah *et al.*, 2010). Generally, these interventions led to low agricultural prices and production, which later required major market reforms and external assistance (Kilima *et al.*, 2008).

History reveals that during the government intervention and control era, in some developing countries there were initiatives of providing Agricultural Market Information Services (AMIS). The government of Tanzania for example, established the Marketing Development Bureau (MDB) in 1970 with financial support from UNDP and FAO (Mbiha *et al.*, 2001). MDB provided advice to the government on marketing policy; provided training; established regular market news service; set consumer prices; carried out research on costs of crop production; and recommended producer prices for staples and major cash crops (Mbiha *et al.*, 2001). In Indonesian, the marketing information system was established in the late 1950s as a price monitoring system to collect weekly producer and wholesale prices for all food crops (Shepherd and Schalke, 1995). The Nepalese government, in 1960s established the Agriculture Economics Section (AES) for collecting retail prices of some agricultural commodities (Awasthi, 2007).

During the 1980s and earlier 1990s most government adopted a series of economic reforms, including agricultural market liberalization (Barrett and Mutambatsere, 2005; Kherallah *et al.*, 2010). These reforms were promoted by multilateral and national aid agencies, the World

Bank, the International Monetary Fund, the European Union and USAID (Tollens and Gilbert, 2003). The agricultural reforms intended to reduce or eliminate the bias against agriculture and open the sector to market forces. This was envisaged to promote private-sector activities and fostering competitive markets and hence lead to increased agricultural production. Under the reforms, most governments retained regulatory and public support functions. Advocates of food market reform have encouraged liberalization to reduce costs in the marketing system, thereby raising and stabilizing farm incomes, promoting farmers' incentives to use productivity-enhancing inputs, and reducing poor households' dependence on food aid for their survival (Negassa and Jayne, 1997).

There was a concern that market liberalization might result in less transparent marketing and loss of market power by farmers and thus the need for a performing market information system then came up (Tollens, 2006). Thus, Market Information System in sub-Sahara Africa (SSA) emerged because of economic liberalization policies and structural adjustment, when governments stopped intervening directly in the markets via marketing boards or parastatal organizations (Tollens, 2006). Market Information Systems adopted after liberalization were intended to correct the asymmetries created by economic liberalization, giving more bargaining power to farmers, creating a more transparent, open trading environment and fostering more efficient market systems for all stakeholders (Tollens, 2006). These Market Information Systems also provided market information to government officials to monitor the economic liberalization and to be able to intervene when required (Tollens, 2006). Most MIS were initiated and established with funds from donors.

Some AMIS initiatives in African developing countries took place in 1990s. In 1993, Zambia established an Agricultural Marketing Information Centre (AMIC) as part of the policy of market liberalization to collect, analyse and disseminate weekly and monthly market information on a range of staple grain products, tuber and vegetable prices and agricultural inputs (Mwanaumo, 1999). In 1992, the Ethiopian government established the Ethiopian Grain Trading Enterprise (EGTE) after downsizing the Agricultural Marketing Corporation (AMC) (Negassa and Jayne, 1997). The role of EGTE was to stabilize producer and consumer prices and maintain buffer stocks; and EGTE played only a minor role in the grain marketing system (Negassa and Jayne, 1997). The Malian government established the Agricultural Market Observatory (OMA) in 1989 to oversee the proper functioning of the data collection, transmission and diffusion of data and information: the prices and the

quantities of agricultural products (cereals, horticultural and fishery products) and the prices and quantities of inputs (Zoltner and Steffen, 2013). Prior to establishment of OMA, during the liberalization, the Malian government had the Programme de Restructuration du Marché Céréalier (PRMC) which among other functions, provided market information to consumers, farmers, and others in the private and public sectors (Dembélé and Staatz, 2002). In 1991, Mozambique started Agricultural Market Information System (SIMA) to provide agricultural market information including data on agricultural prices of the main crops cultivated in the country, input supply and seed availability, and information on production and demand estimates (Pimentel and Francisco, 2009).

Access to marketing information was very limited during this era. Different media were involved in the provision of marketing information such as telephone calls, radio, TVs, word of mouth and newspapers from selected markets. Rural farmers heavily depended on battery powered radios due to lack of electricity in remote areas. Marketing information were generally provided or broadcasted periodically. This system of disseminating information was generally ineffective as marketing information were generally limited to small number of markets and a few individuals. Collecting marketing information by visiting or calling involves some costs and this contributed to unequal dissemination/communication of information. In this way, remote farmers, traders, and consumers were not favoured and could not participate in marketing activities effectively.

3.3. The Need for Provision of Market Information

Establishing market information services is seen by some scholars (Ferris *et al.*, 2008; Shepherd, 1997; Svensson and Yanagizawa, 2009; Tschirley *et al.*, 1995) as a means of increasing efficiency of marketing systems and promoting improved price formation. Market information products include market news (e.g. information on prices, quantities, market conditions, and business contacts), market analytical reports (e.g. reports that analyse factors that cause changes in market conditions and their effects on stakeholders), and business reports (e.g. providing information that can help stakeholders identify reliable trade partners). Not all MIS produce all these products (Staatz *et al.*, 2011). Tschirley *et al.* (1995) clearly stated that market information is a public good according to economists' theories. Shepherd (1997) supported this concept by stipulating that the preconditions for a market economy is that correct information on market conditions must be available and accessible to public. Ferris *et al*. (2008) noted that market information in most developing countries is considered

as a public good service provided by the government agencies. Leaving the whole task of providing marketing information to the private sector might not be beneficial as anticipated. The cost of investing in the provision of timely market information services by a private agent may exceed the return that is perceived to be received. The cost of collecting market information may be greater as individual traders may repeatedly collect the same information (Tschirley *et al.*, 1995).

Market information services usually involve the regular collection of commodity prices from major markets and supply conditions, processing and storing them, and disseminating the information to different stakeholders using one or more channels (Staatz *et al.*, 2011). Dissemination of price information and market news is usually achieved through various media such as radio, magazines, televisions, email, internet, telephone and mobile phone calls. This information is usually intended to different beneficiaries like farmers, traders, consumers, policy makers, governments, development agencies, scholars and researchers. According to Shepherd (1997), information for use in marketing systems can be categorized as either up-to-date, current information or information compiled over time, usually several years, referred to as historical information. Current information facilitates efficient bargaining while historical information is used for production planning, storage decisions, government planning and Early Warning system for food security.

Access to timely market information services and analyses has benefits to market participants. Several scholars have associated this access with positive development in agricultural sector (Ferris *et al.*, 2008; Shepherd, 1997; Svensson and Yanagizawa, 2009). They argue that improved information enables farmers to plan their production more in-line with market demand; schedule their harvests at the most profitable times; and decide to which markets they should send their produce and negotiate on a more even footing with traders. Other benefits have been seen for traders. Improved information enables traders to move produce profitably from a surplus to a deficit market; and make decisions about the viability of carrying out storage, where technically possible. The Système d'Information sur le Marché (SIM) (monitoring 13 markets within the capital city of Mali, Bamako), for example enabled consumers in Bamako, Mali, to find the markets with the lowest prices within the city (Staatz *et al.*, 1992). Access to market information encourages also long-distant trade by giving traders reliable information about the conditions in distant markets.

Market information services provide transparency by creating awareness of all parties of

prevailing market prices and other relevant information (Shepherd, 1997). By improving transparency of the marketing system, reducing the riskiness of participating in the markets, and transmitting market signals more effectively to farmers and traders, they are encouraged to produce more for the markets (Staatz *et al.*, 1992). Thus, market participants can decide when and where to sell their produces or even store and sell them later to take advantage of expected higher prices. Improved market information services facilitate efficient allocation of productive resources and improve the bargaining position of farmers with traders. Farmers with access to timely and reliable market information can decide to which market they should send their produce to maximize returns. Improved market information strengthens both the availability of and access to food (Staatz *et al.*, 1992). Retailers in Bamako cited this as major benefit of access to market information because the transaction costs of taking and transferring ownership of cereals are reduced (Staatz *et al.*, 1992).

Lack of access to timely and reliable market information is an entry barrier to both production and trade. Well informed farmers may shift the cropping pattern to higher value produce. A trader may find it very difficult to begin trading without information. Lacking in market information services reduces competition within markets. Absence of public market information services may lead to market participants to invest in gathering information themselves, thus duplicating costs. Traders without market information may accept the risks of uncertainty involved in going to market without knowledge of prices, an option which is socially inefficient and inequitable.

3.4. Nature of Markets

A variety of market agents are involved in moving produces from farms to rural and urban consumers and markets. These include farmers who produce and sell; traders, including retailers, intermediaries, semi-wholesalers, and wholesalers; and transporters. Farmers sell their production to local and visiting traders, and intermediaries, who sell to consumers, retailers, other traders and wholesalers. Wholesalers are primarily responsible for inter-regional trade, selling the commodity to other wholesalers, retailers, or consumers. Eskola (2005) identified four types of markets as the key role for transactions namely village markets, regional markets, national markets and export markets. Traders buy and sell produces on a system of traditional markets which are held on a weekly basis. A village may have its own market; or a market may be organized that serves many nearby surrounding villages. The geographical location of the market affects its density. Movement of produce

and traders from one market to another is associated with market information which improves market performance by enabling transparency, competitiveness and efficiency and increase the welfare of farmers (Shepherd, 1997).

Access to markets and market information has positive impacts on the welfare of farmers. Svensson and Yanagizawa (2009) in studying the impact of Market information rural maize farmers in Uganda found that access to market information resulted in higher farm-gate prices and improves farmers' relative bargaining position vis-à-vis local traders. Aker (2010) found that the access to market price information through mobile phone coverage in Niger reduced agricultural price dispersion across markets by 10 per cent. Tschirley *et al.* (1995) in their study to develop an efficient grain marketing system in Ethiopia noted that improving farmers and traders awareness of prices in various markets throughout the country promoted grain system efficiency by encouraging grain flows from relatively surplus to relatively deficit areas, thus helping stabilize prices over space; improving farmers' decisions and confidence regarding what to plant, how much to invest, and where and when to market their produce; and promoting a more competitive marketing system, which will benefit both producers and consumers. Access to timely and up-to-date information may also benefit governments to effectively address the food insecurity problems. Food price increase may signal food supply shortfalls in certain areas, and give an early warning of the possible need for food relief or other government interventions in these areas. Due to this, many countries in developing countries have or are establishing market information services.

3.5. Media of Communicating Information

The recent development of technology changes has witnessed the utilization of ICTs in collecting, storing and disseminating information in developing countries. Some studies (Ferris *et al.*, 2008; Shepherd, 1997) noted that agricultural market information is present in most developing countries and their qualities vary depending on technology used for collection, time of capturing, and their management. Initiatives, both public and private, are in place to link markets and markets participants. Use of radio broadcasts, telephone and mobile phone calls, newspapers, noticeboards at markets and TVs is common in dissemination market information in developing countries (Chomba *et al.*, 2002). Shepherd (2011) hinted that still majority of smallholder farmers rely more on word-of-mouth to access and get market information from other farmers and traders. Such market information is usually disseminated or broadcasted periodically e.g. once a week. Sometimes market

information may be disseminated through telephone calls or word of mouth from others and even visiting the markets or through agricultural extension officers. This means of disseminating information pause great challenges to market participants. Rural people find it difficult to access newspapers and make calls and thus this limits their access to information. The information provide in this way may not be up-to-date as prices in the markets are changing frequently. Poverty may also limit rural people in accessing information due to cost involved. Tschirley *et al.* (1995) noted that information provided in this way is limited to a very small number of markets; markets involves significant costs, and these costs are repeated over all participants; and poor and remote farmers, traders, and consumers may be unable to access information in these ways, contributing to unequal and inequitable distribution of information.

Use of modern market information services is linked to more benefits to market participants. These usually can be accessed anytime; anywhere provided the access requirements are met. Electronic mail and Internet services are spreading rapidly in developing countries, and in some cases, are providing marketing information. In Zambia, for example, market information is available on Zamnet through the web site of the National Farmers Union (Van Crowder, 1997). Of all the media available, radio is still by far the most effective way of communicating market information with small scale farmers in many developing countries. A survey done in some parts of Uganda revealed that majority of small-scale farmers, traders/processors, and farmer groups accessed FoodNet market information through radios and the field technicians and fewer respondents gained access to the information via newspapers and the recently introduced cellular mobile telephone network which provides the SMS (Ferris and Robbins, 2004).

African developing countries face some problems in broadcasting market information country-wide. Announcing prices through newspapers or bulletin boards may have no immediacy. Information dissemination through radio and TVs broadcast at sometimes may occur at times when farmers and traders are not available to listen to them. Shepherd (1997) showed how these problems were prevalent in Zambia, Ethiopia and Lesotho, where prices were broadcasted when most traders were in the markets or farmers were in their fields. In short, price information broadcasts were at wrong times. Radio broadcasts in local language may also benefit many farmers and traders. Again, in Guinea Bissau, price broadcasts in Portuguese did not benefit farmers and traders as it had been in their local language of Creole

(Shepherd, 1997).

3.6. Recent AMIS in Developing Countries

Scholars are arguing that the provision of agriculture market information services should be the responsibility of the governments and their agencies (Ferris *et al.*, 2008; Tschirley *et al.*, 1995). These scholars consider information as a public good. Several initiatives both by governments and private sectors are in place to ensure the provision of market information to recipients. The social benefits of collecting and disseminating accurate and timely market information exceeds the returns that a private company would receive from investing in such activity (Tschirley *et al.,* 1995). Private companies collecting marketing information tend to keep that information secret to them and this may lead to repetition of data collection and waste of time and money. Private entrepreneurs specializing in market information provision may face the problem of recovering the investment costs due to the problem of high exclusion cost where the sold information spreads easily to people who do not pay for it to the providers.

Farmer organizations are also utilizing ICTs to function more efficiently to attract and retain a wider membership, generate more funds and provide better services to their members (Harrod and Jamsen, 2011). Short messaging service systems enable farmers to compare prices in different markets and to take a stronger negotiating position when selling their produce. For example, Zambia's National Farmer Organization is utilizing SMS systems to provide marketing information to its members, likewise Burkina Faso Farmers use ICTs to share new production, processing, and marketing skills (Harrod and Jamsen, 2011).

Developing and utilizing ICT applications in delivering agricultural information to recipients are constrained by many factors and challenges in developing countries. Some of these challenges are related to market access and infrastructure, and others to ICT infrastructure and the mode of delivery of information. Ferris and Robbins (2004) reported that agricultural markets are characterized by a long chain of transactions between farmer gates and consumers, lack of competitiveness between traders, and poor access to appropriate market information. Small scale farmers in developing countries are restricted to market access by lack of information. As information is rarely or symmetric, Aker (2010) noticed that this brought excess price dispersion across markets. Bibangambah (2002) observed that due to lack of market information, organic coffee growers in Uganda were paid the prices of non-

organic coffee. Ferris and Robbins (2004) reported large scale traders and processors in Uganda complained of a lack of information about regional markets as existing AMIS were inadequate and could not provide timely information to facilitate marketing of agricultural goods. Poor roads and other hard marketing infrastructure that integrate the isolated rural areas with regional and national marketing system are also reported to limit access to markets and market information by rural farmers. Ugandan farmers received fewer prices than they could have achieved if they had means of transporting their produces to the markets (Bibangambah, 2002; Ferris and Robbins, 2004). Another factor that is hindering access to markets and marketing information in developing countries is lack of clear legal and regulatory environment to promote competitive markets. In developing countries, larger businessmen or farmers organization may take small farmers' produce on loan with promise of paying them in a short prescribed time. But this may take time and the value of money may depreciate and thus lead to loss to farmers. Because of this, farmers in Kilimanjaro are hesitating to grow coffee (cash crop) in favour of bananas and maize (food crops).

3.7. Status of AMIS in Developing Countries

Government's operated marketing information services often function poorly or do not function at all in many developing countries (Van Crowder, 1997). A survey conducted by FAO in 1995-96 in 120 developing countries found that only fifty-three governments operated functioning marketing information systems. Most of these systems focused on data gathering (done poorly) and failed to translate data into commercially useful information for farmers and traders. The survey found that only thirteen countries had daily transmissions of price information (Shepherd, 1997). Some reasons for such failure were budgetary constraints and inadequate financing (Tollens, 2006), data collectors lacked transportation and training, delays in processing and disseminating market data often resulting in out-dated information that was of little value to farmers and traders (Shepherd, 1997). Furthermore, traders were reluctant to divulge information for fear of being taxed (Tollens, 2006). MIS planners have tended to 'overdesign' services, paying little attention to the capacity of the organization providing the service to continue to do so on a reliable basis (Shepherd, 1997). Overall, some of these systems are growing well while others are stalled pilots.

Despite all the constraints, developing countries are witnessing the flourishing of market information systems for handling agricultural related matters. These systems are either public or private owned. Interestingly, majority of the systems are still donor funded and thus their

sustainability raises questions after door withdraw. Initiatives are in Sub-Sahara developing countries to provide AMIS, preferably to farmers and traders. These initiatives have been slow due to low rate of penetration of ICTs in rural areas, illiteracy, and constraining infrastructure like electricity. Many programs aimed at improving farmers' access to agricultural market information in low income and transient economies had been skyrocketing in the last 10 years and a 2009 joint CIRAD-MSU survey identified 49 MIS initiatives in 19 Sub-Saharan African countries (Staatz *et al.*, 2011). MIS created between 1989 and 2000 by states in Sub-Sahara developing countries were mainly focused on price reporting. Since mid-2000s, different models of AMIS have emerged, including governmental projects, private efforts or public/private partnerships. Most focus on a country or set of commodities, while a few provide information on regional markets (Zoltner and Steffen, 2013). Some AMIS runs by farmers organizations primarily focus on providing farmers with information on agriculture and agriculture marketing. The information typically includes availability of inputs, markets and prices at different markets. Some examples of these are Observatoire du Marché Agricole (OMA) in Mali, Economic Information System of Vegetables in Madagascar, and Zambia National Farmers Union (ZNFU).

Private-operated AMIS offers the promise of financial sustainability through the sale of information to users, permitting advertising and/or providing fee-based additional services (Zoltner and Steffen, 2013). Subscribed users usually get access to various updated information about agriculture and agriculture marketing. Examples of these are Esoko (which is based in Ghana and active in 16 countries), Infotrade in Uganda, and Manobí in Senegal. The recent development has witnessed the evolution of agricultural commodity exchange services (ACEs) which are MIS that combine market price information with a commodity exchange information service. With this innovation, agricultural commodities are exchanged with cash, and delivered on spot without engaging the appointed brokers and without taking ownership of the produce being exchanged (Tollens, 2006). More African countries have launched exchanges since 2004, including Malawi Agricultural Commodity Exchange (MACE) in 2004, Zimbabwe Agricultural Commodity Exchange (ZIMACE), Ethiopia Commodity Exchange (ECX) in 2008, and Zambia Agricultural Commodities Exchange (ZAMACE) in 2007 (Rashid *et al.*, 2010). Others include the Kenya Agricultural Commodity Exchange (KACE).

Commodity exchanges facilitate market transparency and price discovery through

centralizing trade in certain commodities. Coordination through a centralized exchange reduces transaction costs associated with identifying market outlets, physically inspecting product quality, and finding buyers or sellers (Rashid *et al.*, 2010). This transaction cost has declined in terms of the average number of intermediaries each trader used, average number of people consulted and involved to make a transaction per market day, and time required per transaction (Mezui *et al.*, 2013). This reduction in transaction costs accompanied by enhanced information flow can improve returns to market agents while reducing short-term price variability and spatial price dispersion (Rashid *et al.*, 2010). Most commodity exchanges in Africa have not been able to attract sizeable trade volumes and have limited their roles in providing price information. South Africa has been able to make it exchange sustainable (Rashid *et al.*, 2010).

Public AMIS are usually sponsored by the Governments through the responsible ministries e.g. the Ministry of Agriculture/Trade. Examples of public AMIS include SIARM in Senegal, the AMIC in Zambia, the SIMA in Mozambique, Agricultural Marketing Information Services in Cameroon, and the Livestock Market Information System (LMIS) in Tanzania, Ethiopia and Kenya. Agricultural Marketing Information Services run by governments are independent and thus likely to be unbiased, they offer information over several years and they provide information that can be used to help farmers get better prices and plan for production, such as what to plant or when out-of-season production can be advantageous (Shepherd, 2011). On the other hand, Shepherd (2011) was sceptical that government operated AMIS may not always reach the smaller farmers, information provided may not be up-to-date and available too late to be of any use and with little analysis.

Due to increasingly regional nature of agricultural markets (Zoltner and Steffen, 2013), there are emerging regional market information systems that provide regional access to agricultural and marketing information. The Regional Agricultural Input Market Information and Transparency System (AMITSA) operating in Kenya, Uganda, Tanzania, Rwanda, Burundi, Malawi, Zambia and Mozambique has the objectives of improving access to timely data and information on agricultural input markets, establishing business linkages in value chain, reducing input procurement costs, increasing the use of inputs and increasing agricultural productivity. Regional Agriculture Trade Intelligence Network (RATIN) provides market intelligence online and through SMS for the agriculture markets in Kenya, Uganda, Tanzania, Rwanda, and Burundi.

3.8. The Missing Links

It is envisaged that access to markets and marketing information will empower farmers to be better positioned in negotiating the prices of their produce with traders. Some AMIS like OMA in Mali and FoodNet in Uganda are claimed to have been very successful (Tollens, 2006), however, their impact evaluation is yet to be done. Impact evaluation of AMIS can determine the market efficiency effects, the reductions in transaction costs and the improved market integration that have undoubtedly occurred. Impact evaluation may determine whether poor farmers obtain better market access and are gaining better prices for their produce. This evaluation can be conducted to include various stakeholders like smallholder farmers, consumers, intermediaries, and traders.

Agricultural Marketing Information Services in developing countries also lack a clear business model that allows for their financial sustainability. Because of this some AMIS are stalled projects, some are not collecting price information without disseminating them and others are completely not functioning. This absence of or poor performance of AMIS is not due to lack of appreciation of their importance rather several factors. Lack of resources (esp. finance) has been a root cause of the poor performance of most AMIS. As a result, years after their establishment, many AMISs are still supported by donor. A survey conducted in 2013 by USAID in East African countries revealed that majority of AMIS continued to receive grant or donor funding, in many cases several years after start-up (Zoltner and Steffen, 2013). Under this age when the Governments are under pressure to cut expenditure, there is little political readiness and willingness to support services with few visible benefits.

Isolated rural areas have also poor roads and lacks important infrastructure like electricity. As of this, transport to and from the rural areas is difficult and thus this limits access to agricultural markets and agricultural market information. Due to lack of clear power sources, investing in ICTs infrastructure in rural areas have been very difficult.

3.9. Conclusion

Based on the reviewed literatures, it is evident that access to agricultural markets and agricultural market information is essential for agricultural development. Information enables smallholder farmers to decide what to plant, when and where to sale, and to negotiate better for the prices of their agricultural produces. This agricultural development can be translated

to increased individual's income growth, rural development and national development at large.

This improvement can only be achieved if different stakeholders play their roles as expected. The Governments can ensure that enabling infrastructures are established to enable for transporting agricultural commodities from rural areas to markets in urban areas or elsewhere markets can be found. The infrastructure may comprise improvements in roads, providing electricity in rural areas and developing policies that ensure smallholder farmers are not exploited in the markets. The infrastructure can also ensure that the provision of agricultural market information is possible which may involve set-up of ICT based systems.

Another very important issue is the support of provision of AMIS. As it is reported in literatures, most AMIS in developing countries suffers financial instability once donor supports have been withdrawn. Policy makers in developing countries can develop policies which explicitly state the role of the governments in the provision of agricultural information. Though, the success of this will depend on the political willingness and commitment as politicians are motivated by services that have short term impacts. Before establishing the financial model that will ensure the sustainability of the provision of such services, agricultural information may be provided free i.e. considered as public goods. Once users i.e. smallholder farmers and traders are well acquainted with the importance of agricultural market information, then they can be charged for such a service. The next chapter, i.e. Chapter Four, will study access to markets and use of agricultural market information in Tanzania rural context.

CHAPTER FOUR

ACCESS TO AGRICULTURAL MARKET INFORMATION BY RURAL FARMERS IN TANZANIA

ABSTRACT

Access to agricultural markets and agricultural market information is essential for participating in agricultural markets. Some benefits more in the agricultural marketing chain. Due to poor access to agricultural markets, rural farmers have for so long depended on subsistence farming leaving other stakeholders in the chain benefiting more. This chapter explores the access of agricultural market by rural farmers, and access, use, and challenges of agricultural market information among rural farmers. The study also explores use and adoption of ICT among rural farmers in Tanzania. The study involves use of questionnaires during the survey to collect data from the respondents. Findings shows that still traditional media are prevalent over accessing agricultural market information and that ownership and use of ICT are increasing in rural areas. Illiteracy, cost of communication, lack of connectivity, market structure and poor physical infrastructures are among the factors constraining access to markets and agricultural market information by rural farmers. It is proposed to ensure physical access to markets and provision of agricultural market information to rural farmers.

4.1. Introduction

As in other Sub-Sahara developing countries, agriculture in Tanzania has been a mainstay for the majorities, providing employment, export earnings and even contributing greatly to aggregate growth and GDP (Leyaro and Morrissey, 2013). The agricultural sector comprises of crops, livestock, forestry and hunting sub-sectors. The sector is the main vehicle in the national economic strategies to combat poverty and enhance economic development. About 80 per cent of Tanzanians depend on agriculture for their livelihoods (Leyaro and Morrissey, 2013). The sector contributed approximately 35 per cent of foreign exchange earnings between 1999 and 2006, and in 2006, it contributed about 75 per cent of total employment and 26.2 per cent of the GDP (URT, 2008). The figures suggest that any improvement in agriculture will have an impact in rural livelihoods and the nation at large. Despite its importance, agricultural sector is dominated by small-scale farming and a large proportion of production is for subsistence (Johnston and Mellor, 1961).

Most smallholder farmers live in rural areas where they conduct agricultural activities and where poverty is a phenomenon. Poverty reduction in developing countries will depend on the performance on this agriculture sector (Leyaro and Morrissey, 2013). The government has established different strategies and policies to transform agriculture and to ensure efficient performance and enhanced productivity. In Tanzania, policies and plans like "agriculture is the mainstay of the economy" and "Kilimo Kwanza" (Agriculture First) have not resulted to improved agricultural productivity and enhanced livelihood as claimed before (Leyaro and Morrissey, 2013). The National Development Vision 2015, the main national development strategy in Tanzania, places considerable emphasis on the sector and envisages that by 2025 the economy will have been transformed from a low productivity agricultural economy to a semi-industrialized one led by modernized and highly productive agricultural activities that are integrated with industrial and service activities in urban and rural areas (URT, 1999).

This chapter will examine the challenges restricting rural farmers in accessing agricultural markets and using marketing information in Tanzania. Different scholars have argued that access to markets and marketing information can help develop competitive markets which can improve the economy of both the producers, traders and the nation at large. Different studies have revealed that smallholder farmers in Tanzania were not prepared to respond to free markets economy (Kawa and Kaitira, 2007). This is because farmers have little access to markets and lack marketing information (Kawa and Kaitira, 2007). To help farmers access the markets, it is encouraged to develop supporting market institutions and provision of adequate essential public goods and services such as technological and information services, marketing services etc. (Amani, 2005). Different studies have acknowledged the necesity of helping rural smallholer farmers to access markets (Kawa and Kaitira, 2007; URT, 2008). Access to agricultural markets can be interpreted as physical access to markets by small scale farmers who are producers of agricultural products, and also access to agricultural market information which are relevant in agricultural marketing dealings.

4.2. Related Works on Market Access

In recent years, the importance of small-scale farmers in agricultural sector in developing countries has been recognized and acknowledged (De Janvry and Sadoulet, 2010; Jain *et al.*, 2011; Okello *et al.*, 2010; Salami *et al.*, 2010). Different schools of thought are emerging aiming at boosting the agricultural activities of smallholder farmers. Scholars argued that for agricultural development to be achieved, it is essential to engage the overwhelmingly

majorities of smallholder farmers who live in rural areas (Diao and Hazell, 2004; IFPRI, 2004; Magingxa and Kamara, 2003; Resnick, 2004). These scholars argue that agricultural development has a strong multiplier effects and that agriculture can aid other sectors by providing employment and materials. For example, production of cash crop can directly benefit smallholder producers while indirectly benefiting others through increased demand for hired labour, and providing employment to others in the production and processing industries. Thus, agricultural production provides opportunity for smallholder farmers to raise their incomes through their successful participation in markets i.e. local, domestic, national, regional and international. Thus, the research and development has broadened their focus from building up farmers' production capabilities to facilitating farmers' access to markets (Shepherd, 2007).

To stimulate pro-poor growth and make markets work for the poor, more emphasis has been on enhancing farmers' access to markets, by engaging them in value-adding activities and by group marketing (Gulati *et al.*, 2007; Miehlbradt *et al.*, 2005). The proponents of this thought strongly argue that effective market access can lead to increased incomes and food security, more rural employments, and sustained agricultural growth. Hugo *et al.* (2006) supports the market access scholars by narrating that greater agricultural market access means increased trade and from increased trade comes greater income growth. Better access to market is crucial in smallholder development because it creates the necessary demand, offers remunerative prices, thereby increasing smallholders' incomes, results in expanded production and the adoption of productivity enhancing technologies (Al-Hassan *et al.*, 2006).

Other scholars have revealed that smallholders-led economy is obstructed by lack of market access (Al-Hassan *et al.*, 2006; Dorward *et al.*, 2004; Ton, 2008) and that much of the literature on market access highlights the pervasive imperfections of markets in the developing world (De Janvry *et al.*, 1991). Many smallholder farmers do not well understand the markets, how they work and why prices fluctuate; they have little or no information on market conditions and prices; they are not organized collectively; and they have no experience of market negotiation (IITA, 2001). Smallholder farmers lack access to markets and hence fail to take advantage of market opportunities due to lack of information on prices and technologies, lack of connections to established market actors, distortions or absence of input and output markets, and credit constraints (Markelova *et al.*, 2009). Small farmers have weak bargaining because they do not have timely access to salient and accurate information

on prices, locations of effective demand, preferred quality characteristics of farm produce, nor on alternative marketing channels (Magingxa and Kamara, 2003). Other scholars (Dorward *et al.*, 2005; Kydd and Dorward, 2004; World Bank, 2001) have linked poor access to markets by small scale farmers to structural problems of poor infrastructure and weak institutions. Poor infrastructure like rural roads lead to high transaction costs, delays the transportation and decreases size and profitability of market (Shiferaw *et al.*, 2011). Lack of storage facilities at markets leads to loss of perishable goods, and increases risk to traders. Weak institutions representing farmers in developing countries have been also cited as barriers for market access by farmers. Lower level institutions are still underdeveloped and unable to function as credible players at the national and export market (Eskola, 2005; van Tilburg and van Schalkwyk, 2012).

The consequences of poor or lack of market access by smallholder farmers are many. Some literatures (Dorward *et al.*, 1998; IFAD, 2003; Jayne *et al.*, 2002; Kherallah and Kirsten, 2002) have linked problems of market access by small-scale farmers to several constrains: price risk and uncertainty, insufficient numbers of middlemen, difficulties of contract enforcement, inability to meet standards, and cost of putting small dispersed quantities of produce together. Poor infrastructure leads to high transaction costs in transportation of agricultural products to markets and lack of storage facilities at markets also increases the transaction costs (van Tilburg and van Schalkwyk, 2012). Lack of market information like produce prices, demand for a certain product etc. results into farmers selling their produce at a price lower than market price. Overall, poor access to markets by smallholder farmers distorts investment in agriculture production and hinders the rural poverty reduction programs.

Working on issues of market access, scholars have explained it differently. Shepherd (2007) described market access as the total of all skills acquired through experience or training that enable a farmer to get and maintain regular customers to his/her produce. van Tilburg and van Schalkwyk (2012) described that market access includes the ability to obtain necessary farm inputs and farm services, and the ability to deliver farm products to buyers. The IFAD (2003) considered the issues of market access in three dimensions: physical access to markets (distances, costs etc.); structure of the markets (asymmetry of relations between farmers, market intermediaries and consumers); and producers' lack of skills, information and organization (understanding of the market, prices, bargaining etc.). Thus, the issue of market

access denotes a marketing relationship between a seller (farm producer) and a buyer (agricultural traders) and is centred to developing small-scale agriculture for poverty reduction by ensuring the producers access the markets (physical markets, traders and consumers) without difficulty.

4.3. Improving Agricultural Markets Access

Efforts to link smallholder farmers to markets and thereby improve their market access have been a crucial part of many rural development strategies of the past decade. Functioning and accessible markets, particularly for agricultural commodities, are vital for agricultural growth to unfold its potential as a powerful driver of rural poverty reduction (Byerlee *et al.*, 2009; World Bank, 2007). Improving agricultural market access is critical to enable smallholders to enhance their food security and increase their incomes (IFAD, 2003). Various strategies to improve market access of smallholders include:

(i) Training, knowledge transfer and sharing through organized training, workshops etc. for farmers, covering issues related to entrepreneurship, business development services and mentorship programs involving experienced commercial farmers.

(ii) To establish inclusive business models which contribute towards mutual benefits for both smallholder farmers and businesses. For example, in a contract farming agreement, agricultural production is carried out according to an agreement between a buyer and farmers, which establishes conditions for the production and marketing of a farm product or products. Typically, the farmer agrees to provide agreed quantities of a specific agricultural product. Contract farming agreement can provide a farm household with production inputs and services in exchange for the delivery of the harvest to their partner (Kirsten and Sartorius, 2002; Porter and Phillips-Howard, 1997).

(iii) Through Farmer Organizations or Producer Organizations to improve collective action among smallholders that would increase their bargaining power and economies of scale. Farmer organizations can provide a range of services that are critical for market access like marketing services, facilitation of collective production activities, financial services and policy advocacy (Barrett *et al.*, 2010; Hellin *et al.*, 2009; Markelova *et al.*, 2009).

(iv) Facilitating access to financial institutions such as commercial banks, the Industrial Development Cooperation etc.

(v) Targeting the information asymmetries prevalent in rural economies. This involves collecting and disseminating to smallholders in rural areas, market knowledge and

information such as prices, weather, demand and possible trading partners, using market information systems. It is assumed access to market information can improve smallholders' market position and decision-making capabilities. With this, it is important to identify appropriate information-sharing channels, funding mechanisms and needs-oriented content.

(vi) Warehouse receipt systems - Under the warehouse receipt systems, a reputable third party (warehouse operator) guarantees delivery of commodities deposited by a named holder of a warehouse receipt, specifying the quality and quantity of the commodity deposited/stored as well as the delivery location. The warehouse receipt system solves the problems of the lack of storage facilities and the difficulty of obtaining credit. In doing so they also help manage the food security issue and the marketing issue, with an overall result being improved marketing of agricultural commodities (Coulter and Onumah, 2002; Onumah, 2010; Onumah *et al.*, 2007). The Warehouse Receipt System was applied to farmers growing coffee in Kilimanjaro, Tanzania (Onumah *et al.*, 2007).

(vii) Rural assembling point system – traders visit rural areas and identify collection point for farm products. Farmers are then able to send their produce at the collection point for sale (Omore *et al.*, 2004).

Improving market access can be achieved through coordinating various market actors, players and the necessary supporting services. Access to timely and accurate market information is an important element for transforming markets to competitive ones (Tschirley *et al.*, 1995) and serves both to improve production incentives for agricultural producers, and to drive down prices for consumers (Staatz *et al.*, 1992). Improving market access by disseminating market information promotes grain system efficiency by encouraging grain flows from relatively surplus to relatively deficit areas, thus helping stabilize prices over space; improving farmers' decisions and confidence regarding what to plant, how much to invest, and where and when to market their produce; and promoting a more competitive marketing system, which will benefit both producers and consumers (Tschirley *et al.*, 1995).

Providing reliable information on variable market conditions enables for correct decision-making and planning. For example, price flexibility may reflect both supply and demand and seasonality in production and provides producers with incentives to adapt their production to market requirements (Shepherd, 1997). Price increases may signal food supply shortfalls in certain areas, and this gives an early warning of the possible need for food relief while low

grain prices may signal season with good harvests (Tschirley *et al.*, 1995). Overall, scholars are suggesting that there is a potential positive relationship between the increased flow of information and agricultural development (Cash, 2001; Manda, 2002; Raju, 2000).

But what is agricultural market information or simply market information? In a review of the theory and practice of marketing information provision in developing countries, it can be distinguished between market information, which basically consists of data on prices and (sometimes) quantities, and marketing information (Shepherd, 1997). The latter is "a much wider concept, which is likely to include details on potential market channels, payment requirements, packaging, quality and a whole host of information required by a producer to make a successful sale, including market information. Sometimes the two terms are used synonymously as in this study. The Agricultural marketing information is generally used in some ways. In a study to assess the agricultural market information needs to smallholder farmers in Zambia, Chomba *et al*. (2002) suggested that the information is mainly required to make policy decisions (for public institutions and government departments); to monitor changes in the economy; and to assess the food security situation in the country. Marketing information is also vital for relief agents as it provides indications of sources of surplus food and the prices prevailing. Non-governmental organizations also require marketing information to advise the farmers on possible income prospects for each farming activity, as well as promotion of different cropping patterns as supported by price trends, etc. (Chomba *et al.*, 2002).

Access and use of agricultural market information by smallholder farmers in rural areas can be explained better based on different models. Among others, this study has adopted the diffusion of innovation model (Rogers, 1995; Rogers and Shoemaker, 1971) to explain better the use of ICTs in collecting and disseminating agricultural market information. The diffusion of innovation model explains that diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system (Rogers, 1995). According to this model, in any social system, innovation is first adopted by a small but highly innovative group of progressive farmers characterized by owning large farms, high levels of education and mobility with the outside world and frequently in contact with sources of information (Manda, 2002). The innovation then trickles down from progressive farmers to farmers with medium socio-economic status and finally, innovation spreads throughout the social system until most farmers adopt it (Manda, 2002). The basic

argument in this model is that the dissemination of information leads to agricultural change and development through the adoption of new technologies or ideas, or improved farming practices. With the diffusion of innovation model, in the process of adoption, the various channels of communication such as mass media become important at different stages of the adoption process (Manda, 2002). For example, while the radio is very important at the awareness creation stage, the extension agent becomes a critical source of information during the adoption itself. The diffusion of innovation model has therefore had a major influence on the way information is disseminated to end-users like farmers.

To improve access to agricultural markets by smallholders is among the efforts to boost agricultural productivity in developing countries, and therefore to fight poverty. Some scholars (Eskola, 2005; Kindness and Gordon, 2001; Lightfoot and Scheuermeier, 2007; Roy, 2012; Tschirley *et al.*, 1995) have associated rural poverty among smallholders to poor access to both markets and market information. Svensson and Yanagizawa (2009) have called this lack of access to market information or situations of asymmetric information 'a norm' in developing countries while Kindness and Gordon (2001) have noted that poor access to markets is mirrored by poor access to all kinds of rural services. Lack of access to markets also disconnects smallholders from other key people in the market chain, including processors, traders, and consumers (Lightfoot *et al.*, 2008). Because of poor access to markets, smallholders accept seemingly unattractive prices for their produce (Kindness and Gordon, 2001) and respond to low prices by cheating, which further increases inefficiencies along the market chain (Lightfoot *et al.*, 2008). Svensson and Yanagizawa (2009) stress that improving access to market information may help farmers' choice of what to produce, how much to sell, where to sell, and the prices they receive for their outputs.

Agricultural markets in developing countries are fragmented and highly unorganized. Due to this, a direct link between producers and traders might be missing, leading to the introduction of intermediaries (Roy, 2012). Intermediaries often provide this link, negotiating the prices with the farmers and delivering the produces to the markets and traders. The presence of intermediaries (also known as 'middlemen' or 'itinerant buyers') has not been taken positive by many. Intermediaries constitute a "real face" in the otherwise "hidden hand" of the market (Keys, 2005). Some studies have indicated that intermediaries/middlemen fulfil important marketing functions in the marketing system acting as traders, distributors and providers of agricultural produces. A study to explore the exploitation of cassava growing farmers by

middlemen in Africa concluded that prices of cassava were more stable in Nigeria because of the more elaborate involvement of middlemen, which encouraged competition (Enete, 2009). Lightfoot and Scheuermeier (2007) perceive middlemen as parasites exploiting smallholder farmers by taking a large share of their benefit accrued from the sales of produces by taking advantage of smallholder farmers' unawareness of market prices. There are mixed results suggesting that some middlemen are fair while others are exploiting farmers, though middlemen are better informed about market conditions and variables (Mitchell, 2011).

4.4. Research Design

To understand the challenges that smallholder farmers encounter while accessing the markets for their produce, it is important to learn their livelihoods with respect to market access and study the agricultural value chain. Smallholders' interaction with markets can facilitate the understanding of the analysis of the agricultural value chain. The following sections will discuss the three underlying concepts i.e. market access, agricultural value chain and the smallholders' livelihoods.

4.4.1. Market Access by Smallholder Farmers

Section 4.2 has attempted to describe market access detailing the challenges in accessing markets, and consequences of lack to access markets, by smallholder farmers. Due to remoteness or lack of infrastructure, market access problems can affect rural communities, illiterate, poorer, men and women. People from disadvantaged areas find access to markets restricted by high physical costs and by their lack of knowledge of market mechanisms, a consequence of lack of information and organization. Also, the structure of the markets, the limited market intermediaries and asymmetrical market power constrain rural people in accessing markets. Thus, access to markets is constrained by multiple factors as outlined below:

(i) Product Requirements (e.g. quality and quantity standards demanded by consumers) – Product quality and safety standards are constrains that can restrict smallholder farmers in developing countries from accessing international markets (Narayanan and Gulati, 2002). Given the quality and safety standards in developed countries, it is difficult for smallholder farmers in developing countries to cultivate and harvest produce to meet such standards. To meet the standards of developed countries, costs of production of agricultural produce in developing countries will increase. A study by Berry and

Waldfogel (2010) describes that product quality increases the market size and it is among the best competitive criteria in the markets. Interestingly, Gabagambi (2013) noted that the Tanzania domestic markets are not saturated and as a result supermarket are full of imported fresh and manufactured products (as a results of smallholder farmers in Tanzania to fail to meet quality standards).

(ii) Physical conditions (e.g. lack of post-harvest facilities or geographical proximity to markets) – Market access remains highly constrained by road infrastructures and low efficiency of market networks (Gabagambi, 2013; Hélène *et al.*, 2016; Salami *et al.*, 2010). Ferris *et al*. (2014) correlated market access with distance to market and access to roads. Further, Ferris *et al*. (2014) argue that access to roads and transport is typically a function of location, while more remote and poor farmers have less market access than those farmers living in areas with more investment. Other infrastructures that constrain market access by rural farmers are lack of rural electrification, rural transport, and lack of storage structures and warehousing facilities at markets. These constraints increase the transactions costs while transporting produce to markets.

(iii) Market structure - Many markets in rural areas are characterized by presence of large numbers of smallholder farmers/consumers and a few buyers/sellers. In this case, market relations are inequitable, uncompetitive, and not to the advantage of the smallholder farmers. Such market relations may result from lack of (or presence of poor) roads that are not passable during certain season of the year; and small quantity of produce to sell. Poor roads lead to high transport and transaction costs of produce, both to smallholder farmers and buyers. Low productivity and hence low quantities to sell may not attract buyers to travel in rural areas for purchasing produce.

(iv) Marketing costs - High transport costs, arising from the lack of well-maintained roads, long distances and lack of affordable, appropriate transport lead to low producer prices.

(v) Capacities of smallholder farmers (e.g. capital to finance production) - Most smallholder farmers in developing countries like Tanzania depend on savings from their low incomes to invest in agricultural production, which limits the expansion opportunities.

(vi) Information and Communication Technology - Poor or non-existent communications infrastructure for disseminating information on markets, products and prices is a barrier to market access. Lack to understand how markets operate, lack of information and skills are also barriers constraining market access by rural farmers.

Based on the identified market access constraints, it is evident that appropriate concepts need to be adopted while describing market access by smallholder farmers in rural areas in Tanzania. Thus, this study adopts the value chain analysis and sustainable livelihood analysis in describing market access in rural areas in Tanzania.

4.4.2. Value Chain Analysis

The Value Chain in agriculture describes the range of activities and set of actors that bring agricultural products from production in the field, through processing, trading, and delivery to final consumers for consumption, wherein at each stage value is added to the product (Gloy, 2005; Paguia and Casuga, 2008). The Value Chain Analysis (VCA) serves to understand the complex mechanisms of markets, the relationship and linkages between its actors, and their respective constraints as well as their opportunities. Also, the VCA identifies relevant stakeholders, namely value chain actors and service providers, how they are linked to each other, who holds the influence in a chain (i.e. 'power') and how can actors in the chain gain more value and influence. Birthal and Joshi (2007) categorized actors on the value chain for high-value food products as producer-sellers (individual or collective), buyers (commission agents, wholesalers, institutional buyers, processors, exporters, and retail chains), consumers, input manufacturers, and service providers (financial institutions, extension agents, agricultural research institutions, packers, and transporters). Service providers encompass extension services, regulatory agencies and financial services that support the entire value chain's operations.

In the value chain, the production phase concentrates on how, where and when raw materials are produced. In Tanzania, most producers are small-scale farmers, growers and raisers living in rural areas practicing subsistence farming. Traders, collectors or assemblers collect agricultural products from rural farmers and redistribute them to markets and firms in the marketing channel which converts raw materials to finished products. Usually these products are transported to town markets (in districts, regions and cities) and for export markets. Traders may act as intermediaries between producers and assemblers, assemblers themselves, or intermediaries between producers and processors.

In the processing and marketing phase, wholesalers, importers or exporters purchase products (either raw or processed) from rural producers, initial processors or food manufacturers for distribution to retailers who are the ones directly involved in the sale of products or end-

products to consumers. In many instances, traders again serve as intermediaries between producers or assemblers or processors and large distributors such as wholesalers or exporters or importers.

This study has applied a generic VCA (Fig. 4) to understand the market access concepts by smallholder farmers. Section 4.4.1 has shown that market access is multi-dimensional concept constrained by six (6) factors. Based on different dimensions of market access, the generic VCA helps to work on the pertaining constraints and opportunities. The generic VCA helps to understand the following:

(i) Mapping of existing marketing channels;
(ii) Mapping of value chain actors as well as their functions;
(iii) Service analysis;
(iv) Partial economic analysis (i.e. farm-gate prices);
(v) Identification of strengths and weaknesses of the agricultural value chain.

The generic VCA in Fig. 4 does not focus to a specific agricultural product. Its essence is to facilitate the understanding of the market access constrains based on the assessment of items to capture the understanding of (i) – (v) above. The sustainable livelihood analysis has been integrated into the VCA to capture the complexities of smallholders' living conditions.

4.4.3. Sustainable Livelihoods Analysis

Agriculture, as a source of livelihoods is important for the development of poor smallholder farmers living in rural areas in developing countries. Their livelihoods often rely on a diversified farm structure and incomes from farm produce, which influence their decision-making and their attitude towards agricultural intensification (Carswell, 1997; World Bank, 2007). Increasing agricultural productivity boosts agricultural intensification which may increase the quantity and quality of livelihoods (Carswell, 1997). Livelihoods approaches are a way of thinking about the objectives, scope and priorities for development and they place people and their priorities at the centre of development (Haidar, 2009).

The Sustainable Livelihoods Analysis (SLA) aims to identify smallholders' access to resources and livelihood assets, as well as their resulting livelihood strategies, to determine specific interventions for an improved market access for their farm produce. Key elements of the SLA are illustrated in the Sustainable Livelihood Framework in Fig. 5. The Sustainable

Livelihoods Analysis is adopted to obtain a clear picture of how different actors operate within the agricultural value chain and to identify needs and opportunities of smallholder farmers regarding market access. Additionally, the approach is essential to develop recommendations for market access that are relevant to smallholder farmers.

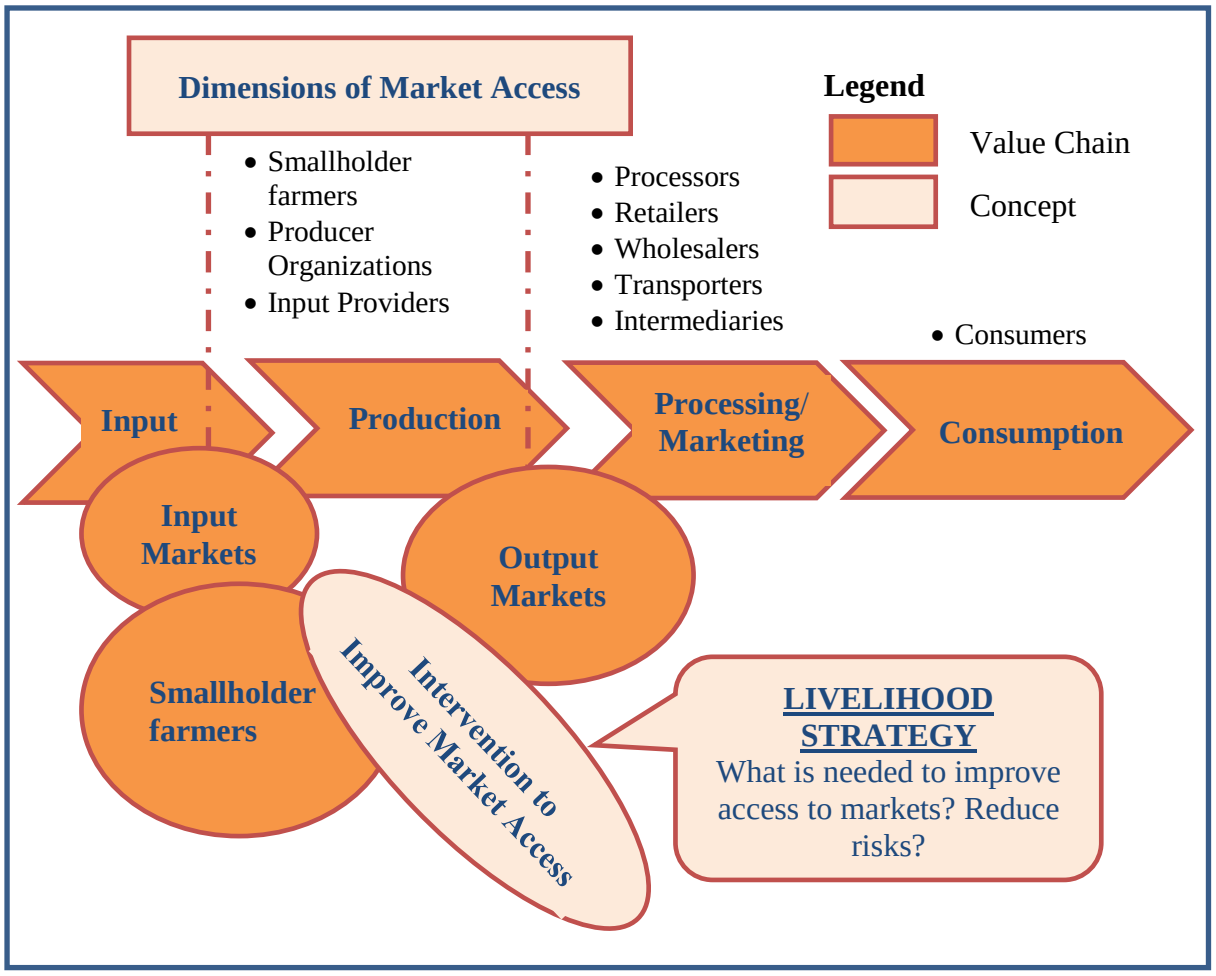


Figure 4: Generic VCA for Agricultural Products

Source: Own illustration

The framework (Fig. 5) shows how, in different contexts, sustainable livelihoods are achieved through access to a range of livelihood resources (human, natural, financial, physical and social capitals) which are combined in the pursuit of different livelihood strategies. Based on the livelihood resources, determinants/indicators of access to markets and market information by smallholder farmers can be identified, analysed and discussed. The combination of the VCA and the SLA enables to understand the difficulties of accessing markets by smallholders and their diverse livelihood strategies. Understanding the challenges/difficulties of markets access, it is possible to diagnose the situation by designing strategies for intervention and effective market access.

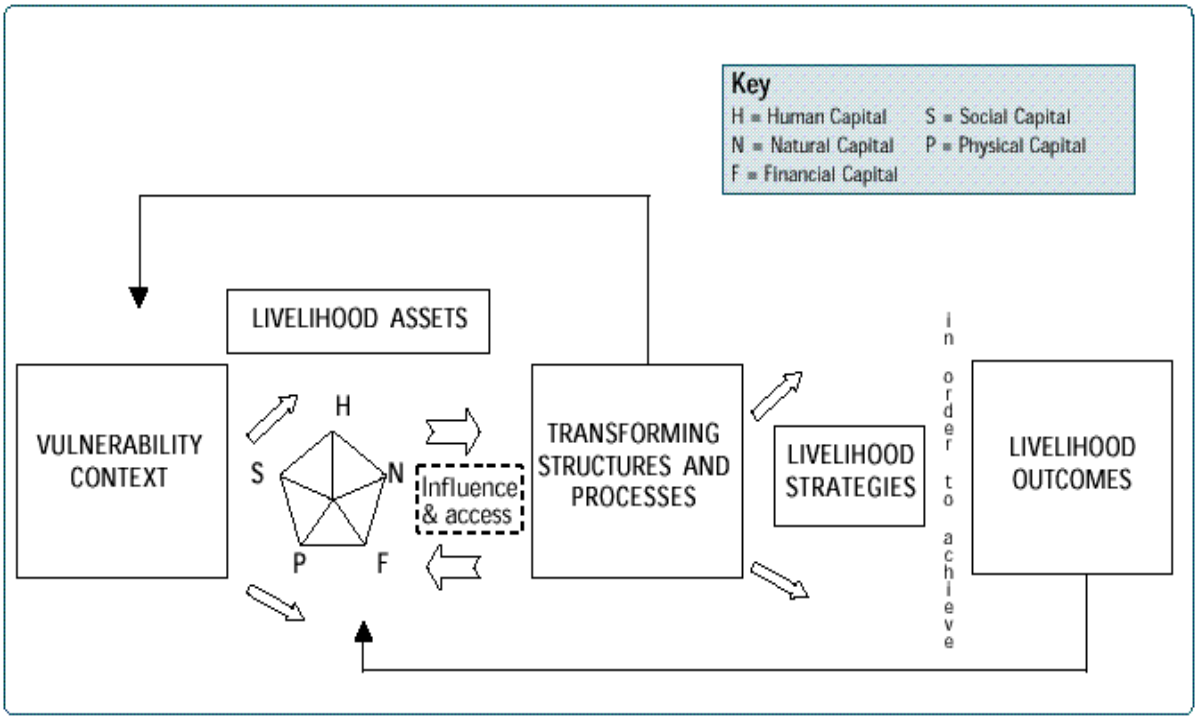


Figure 5: Sustainable Livelihood Framework

Source: DFID (1999)

4.5. Methodology

The empirical research methodology has been created by applying the underlying theoretical concepts, the dimensions of market access, the Value Chain Analysis and the Sustainable Livelihood Analysis to the research framework outlined above.

4.5.1. Study Area

This study was conducted in three districts in Tanzania, namely Hai in Kilimanjaro region, and two neighbouring districts, Mvomero and Kilosa, both in Morogoro region. Two villages were selected and involved in this study from each district. In this respect, Sonu and Mbweera were selected from Hai, Dumila and Chabima were selected from Kilosa, and Makuyu and Dibamba were selected from Mvomero. The districts were selected as they are among the big producers of food crops in Tanzania because of their fertile land as well as good seasons accompanied with good rainfall (Mlozi *et al.*, 2006; Paavola, 2004; URT, 1998). Food produce from these regions are supplied and consumed in big cities in Tanzania. The economies of the identified districts are dominated by agriculture and the allied activities. The major activities include small-scale farming (food and cash crops production – subsistence farming), and cattle keeping (mainly indigenous livestock). Maize and rice are

the major staple food crops grown in Mvomero and Kilosa districts. The two districts, Kilosa and Mvomero, also produce abundantly tomatoes and vegetables and grow cash crops like simsim and sunflower for seed oil. Hai district produces maize, beans and bananas as food crops and grows coffee as cash crops. Modern dairy farming is practiced in Hai district.

4.5.2. Data Collection Method

This study employed three methods in collecting its data during the field survey: observation, unstructured interview (Appendix 1); and use of questionnaire (Appendix 2). Observations and interviews were used to countercheck and validate ambiguous responses and on clarifying responses. With the help of agricultural field officers, two villages were identified from each of the three districts to be included in the study. The researcher visited the villages and the nearby markets serving the identified villages with the purpose of learning the 'real' situation of how agricultural markets operate. Discussion and interview were conducted to selected farmers who were able to volunteer in elaborating the situation as per questions in check list. The key informants were selected based on their knowledge and understanding of the subject matter, the experience on agricultural activities including agricultural marketing, and their availability. Data was also collected using questionnaire distributed randomly to farmers in the identified villages. An informal interview was also conducted to few marketing intermediaries like local food traders and collectors, visiting traders, and consumers.

4.6. Findings and Discussion

4.6.1. Respondents

During the survey phase for data collection, a total of 252 participants were involved in this phase as depicted in Table 3. Participants who were involved in the interview were 36

Table 3: Participants of the study

	Kilosa		Mvomero		Hai		Total			
Method	M	F	M	F	M	F	M	F	T	T (%)
Interview	8	5	7	3	9	4	24	12	36	14.3
Questionnaire	48	28	31	28	47	34	126	90	216	85.7
Total	56	33	38	31	56	38	150	102	252	100.0
Total (%)	89 (35.3)		69 (27.4)		94 (37.3)		150 (59.5)	102 (40.5)		

(14.3%) and 216 (85.7%) respondents were involved in data collection by filling in the

questionnaires. Based on their districts, participants from Kilosa were 89 (35.3%), from Mvomero were 69 (27.4%) and from Hai were 94 (37.3%). Based on gender, males were 150 (59.5%) and females were 102 (40.5%).

4.6.2. Characteristics of Respondents

During the survey, a total of 216 respondents were involved in data collection by responding to questions in the questionnaires. The distributions of respondents based on their districts are tabulated in Table 4 and are 76 (35.20%) from Kilosa, 59 (27.30%) from Mvomero and 81 (37.50%) from Hai. Ages of respondents were between 20 and 70 years. Results from Table 4 shows that majorities of respondents were between 31 and 40 years (i.e. 33.3%), followed by a group of ages between 41 and 50 years (i.e. 24.1%). Respondents of ages between 61 and 70 years were a few comprising 5.1% of the sample.

Table 4: Age of respondents

	Kilosa		Mvomero		Hai		Total			
Age	M	F	M	F	M	F	M	F	T	T (%)
20-30	7	5	6	6	11	4	24	15	39	18.1
31-40	18	10	7	10	17	10	42	30	72	33.3
41-50	13	8	9	5	7	10	29	23	52	24.1
51-60	9	4	8	6	9	6	26	16	42	19.4
61-70	1	1	1	1	3	4	5	6	11	5.1
Total	48	28	31	28	47	34	126	90	216	100.0
Total (%)	76 (35.20)		59 (27.30)		81 (37.50)		58.3	41.7	100.0	

Based on gender, Table 4 shows that majorities of respondents were males comprising 58.3% while females were 41.7%. Education levels of respondents were also assessed and results are

Table 5: Education level of respondents

	Kilosa		Mvomero		Hai		Total		
Education Level	M	F	M	F	M	F	M	F	T(%)
Did not complete standard seven	4	8	2	3	4	2	10	13	23 (10.65)
Standard Seven	37	18	23	22	20	24	80	64	144 (66.67)
Form Four	7	2	5	3	17	6	29	11	40 (18.52)
Form Six	0	0	1	0	2	1	3	1	4 (1.85)
Undergraduate	0	0	0	0	4	1	4	1	5 (2.31)
Total	48	28	31	28	47	34	126	90	216 (100)

presented in Table 5. Majority of respondents were standard seven leavers comprising 66.67% of respondents and a few were form six leavers (i.e.1.85%). A few forms six leavers and undergraduate (2.31%) respondents were employees working in the respective districts. The target was to involve one hundred (100) respondents in each district, giving a total of three hundred (300). The obtained number (i.e. 216) was due to disappearance of some respondents and discarding some unfilled questionnaires with missing data.

Occupations (i.e. economic activities) of respondents were also assessed as presented in Table 6. Results show that majority of respondents (i.e. 195, 90.30%) consider agriculture as their main economic activity, a few are engaged in other activities such as business (i.e. 11, 5.1%) and employee (i.e. 10, 4.6%). A few respondents (i.e. 21, 9.7%) considered agriculture as their second occupation. Small-scale farmers are also engaged in other economic activities like doing small businesses, livestock keeping, and craftsman. Other scholars have similar assessment on the proportions of Tanzania citizens who are engaged in agriculture. Leyaro and Morrissey (2013) noted that some 80% of Tanzanians depend on agriculture for their livelihood. Another study done by Mwakaje (2010) in rural Tanzania in Rungwe districts showed that over 90% of the people in the sample were farmers involved in agricultural production and livestock keeping. In terms of workforce, Manda (2002) noted that agriculture employs over 82 per cent. In terms of GDP, Leyaro and Morrissey (2013) noted that the sector accounts for about 50 per cent of GDP and 75 per cent of export earnings while Manda (2002) noted that the sector contributes about 50 per cent of GDP and 85 per cent of exports. Thus, it can be said that majorities of Tanzanians are employed in agriculture which is a larger contributor to the national economy.

Table 6: Occupation of respondents

Main Occupation	Total	%Total	Other Activities	Total	%Total
Agriculture	195	90.3	Small business	57	26.4
Business	11	5.1	Business	19	8.8
Employee	10	4.6	Agriculture	21	9.7
			Craftsman	14	6.5
			Livestock Keeping	3	1.4
Total	216	100.0	Total	216	100.0

Agricultural production in the three districts is depicted in Table 7. The small-scale farmers heavily produce staple food like maize and rice. Maize is grown in all the three districts while rice is abundantly grown in Kilosa and Mvomero districts. Some years back, coffee was the

main cash crop in Kilimanjaro region, but recently small scale farmers have shifted to maize and banana production. All the produce, maize and rice and banana are considered as both food and cash crops. Sesame is also cultivated in Kilosa and Mvomero as cash crop for production of seed oil.

Table 7: Crops produced by respondents

Crops	Kilosa	Mvomero	Hai	Respondents	Respondents (%)
Maize	74	52	77	203	94.0
Rice	47	51	0	98	45.4
Banana	8	6	73	87	40.3
Beans	7	0	25	32	14.8
Sesame Seed	20	9	0	29	13.4
Coffee	0	0	20	20	9.3

4.6.3. Access to and Use of Agricultural Market Information

Access to agricultural market information is another important aspect to agricultural development. Use of accurate and timely agricultural market information enhances market performance by improving the knowledge of market actors. Use of agricultural market information may help farmers to plan for production to meet market demand, despite helping them on negotiating for the prices of their produce with traders. Different techniques for accessing agricultural market information by farmers are depicted in Table 8. Table shows that farmers can get agricultural information, when selling their produce, from their fellows, consumers or even traders. Techniques employed are listening the radios, using mobile phones, reading magazines and newspapers, watching televisions and attending village meetings (i.e. access from their fellows). Results from Table 8 revealed that rural farmers heavily depend on listening to the radio and using the mobile phones in accessing information. 83% of respondents indicated that they listen the radio for getting agricultural

Table 8: Media for communicating agricultural market information

	Radio		Mobile Phone		Newspapers		Television		Village Meeting	
District	N	N %	N	N %	N	N %	N	N %	N	N %
Kilosa	71	32.90	56	25.90	13	6.00	3	1.40	0	0.00
Mvomero	46	21.30	46	21.30	8	3.70	9	4.20	8	3.70
Hai	64	29.60	62	28.70	18	8.30	22	10.20	3	1.40
Total (%)	181	83.8	164	75.9	39	18	34	15.8	11	5.1

market information and 75.9% of respondents indicated that they use mobile phones for getting and disseminating agricultural market information. The communication services are provided by the mobile phone companies such as Vodacom, TiGO, Zantel and Airtel. Rural farmers have little access to newspapers and televisions. Results also indicate that, in village meeting it is very rare to discuss issues related to access to agriculture market information though agriculture is their main economic activity.

Access and use information in Tanzania rural areas has been studied and reported by some scholars. A study by Jain *et al*. (2011) in six districts in Tanzania reported that farmers are heavily dependent on traditional media as main sources of agricultural information and knowledge. It was also shown that use of ICT was increasing as 89% of respondents claimed to use ICT to access information and knowledge (Jain *et al.*, 2011). Interestingly, it was shown that radio was an appropriate channel for accessing information and knowledge for large numbers of farmers in the rural areas due to its oral nature, low cost and its independence of operation (Jain *et al.*, 2011). Another study by Elly and Silayo (2013) done in Iringa rural districts in Tanzania, showed similar results of prevalence use of traditional media in accessing information. The scholars also showed increased used and hence adoption of mobile phones in rural areas (Elly and Silayo, 2013; Jain *et al.*, 2011; Nyamba and Mlozi, 2012). Thus, one can consider use of traditional media in communication information as well as ICT due to their availability in rural areas.

4.6.4. Access to Markets

Strong links to agricultural markets for rural small scale producers are essential to increasing agricultural production, generating economic growth in rural areas and reducing hunger and poverty. Improving the links boost productivity, increase incomes and strengthen food security. Better access by small producers to markets means that they can reliably sell more produce at higher prices. This in turn encourages farmers to invest in their own businesses and increase the quantity, quality and diversity of the crops grown.

Based on selling points (See Table 9), respondents identified that they sell their produce at the farm, at home or at the markets. At home, respondents usually sell their produce direct to available local consumers and local dealers, and to traders. Farmers also sell their produce at available local markets or nearest markets. Local dealers normally collect the produce and sell them to distant markets or to traders. In very rare cases, local dealers purchase produce

on credit from farmers. Traders usually visit the village and with the help of local dealers or their established links, collect and purchase the produces for sell to markets at towns and cities. Due to some established business links, some traders can purchase produce from farmers on credit.

Table 9: Selling points

	Farm		Home		Market	
District	R	R%	R	R%	R	R%
Kilosa	6	2.8	66	30.6	15	6.9
Mvomero	5	2.3	55	25.5	2	.9
Hai	19	8.8	23	10.6	73	33.8
Total (%)	30	14	144	67	90	42

Results from Table 9 revealed that majority of respondents sell their produce at home (Kilosa 30.6%, Mvomero 25.5% and Hai 10.6%). The results also showed that few respondents from Kilosa (6.9%) and Mvomero (0.9%) while majority of farmers in Hai (33.8%) sell their produce at the markets. Low percentage of farmers indicated that they sell their produce at the farm (Kilosa 2.8%, Mvomero 2.3% and Hai 8.8%). Farmers in Hai prefer to sell their produce at the market rather than selling at their homes due to short walking distance. Farmers in Hai also indicated that they prefer to sell their bananas at the farm or at their homes due to limitation of storage facilities and poor transportation. Coffee growers in Hai usually sell their produce to their cooperative union, the Kilimanjaro Native Co-operative Union (KNCU). Due to changes in crop patterns, farmers in Kilimanjaro (including those in Hai) have favoured maize and rice production and thus have abandoned their coffee farms in favour of maize and rice (Maghimbi, 2007). At some villages, there are local markets that cater for a number of neighbouring villages. The village markets may even emerge at cross-roads or small concentrations of households to facilitate exchange of products among farmers. Well-established formal markets are also available for farmers to send their produce for sell.

4.6.5. Knowledge of Rural Farmers on ICTs

Access to ICTs by rural citizens is increasing as shown in Table 10. Affordability and increased ownership of mobile phones are improving. Rural citizens have access to radio, mobile phones and TVs. Knowledge of rural farmers on the recent ICTs using computers and their associated Internet technology was also assessed. The results in Table 10 indicated that

a few respondents have knowledge of using computers and have access to Internet through their mobile phones. During the discussion, respondents with access to Internet revealed that they visit social media, reading news from local blogs, and search information. Overall, rural areas are characterized by poor access to ICTs as no established access points are available compared to towns.

Table 10: Knowledge on ICTs

	Not knowledgeable		Knowledgeable	
Access to	R	R%	R	R%
Computer	186	86.10	25	11.60
Internet	176	81.50	32	14.80

4.6.6. Market Structure

Smallholder farmers in rural villages are often served by traditional open markets commonly known as 'gulio' which are usually held on a weekly basis. These markets are dominated by buyers collecting and buying produce from smallholder farmers and sell to consumers and other traders in towns. Within these open markets, consumers are the local rural residents themselves and in some cases middlemen play their roles of linking buyers to producers and markets. An open market may serve farmers from the surrounding and neighbouring villages and thus are reached even on footing. These rural markets are not competitive and have limited varieties of produce. Town markets are located within districts and regions. Traders and wholesalers sell the produce they have purchased from village markets to consumers, traders and retailers who operate in town markets.

In recognizing the concern of farmers that they can sell their produces at better prices if market infrastructure is improved and is near their farms, the Tanzania government established the Kibaigwa cereal market at Dodoma, which is strategically positioned at the centre of the country. The market collects cereals from all over the country and it has a pure international face (i.e. provides export market) where prices are determined freely by the market situation of the day. Other cereal markets are Tandale at Dar es Salaam and Himo at Kilimanjaro. These markets provide price information to agricultural producers. For example, at Kibaigwa, the market authority sends market price information to about 72 participating villages each morning by posting the market price information on the noticeboard at each participating village.

Access to markets is very crucial to farmers as it has strong and direct impact on their

income. It can be used to address farmers' concern like access to financial services, inputs and land. Thus, access to markets perhaps may lead to improved price for the produce and thus, to incomes of small-scale farmers.

4.7. Agricultural Value Chain

This section provides an overview of the agricultural value chain as learned during the research, and can be generalized in Tanzania context. The analysis of the value chain will focus on the marketing of the agricultural produce, exploring the diversity of existing marketing channels and the actors involved. Based on SLA, the section will take into consideration and explore the capital endowment of smallholder famers as well as their respective market-related livelihood strategies. Since the focus of analysis is on the marketing of agricultural produce, the production side (including input markets) is not part of this value chain analysis (refer Fig. 4).

Fig. 6 summarizes the trading relationships identified between actors of the agricultural value chain and their marketing channels for the purchase and sale of agricultural produce. The figure shows how different actors interact during such purchase and sale and therefore share and exchange information. To get a clear picture, the following sections will in detail, describe the value chain actors and service providers as well as their linkages, agricultural marketing channels, and weaknesses in the marketing channels.

4.7.1. Value Chain Actors

Once produced, different actors are involved in the collection of agricultural produce, its processing and distribution to final consumers. Fig. 6 depicts the generic agricultural value chain as agricultural product is harvested until it is consumed by the final actor 'consumer'. The figure indicates that different actors are involved and at each stage 'value' may be added to a product.

Smallholder farmers are responsible for the production and supply of the farm products. Fig. 6 depicts the trading parties (consumers, agents, agricultural traders, processors, wholesalers, and producer organizations) of smallholder farmers. Farmers may send their produce to the markets for sale, or buyers may collect produce from smallholders' homes after harvest, or farmers may deliver their produce to the processing facilities for sale. Also, farmers process their produce themselves and sell to consumers, traders and producer organizations.

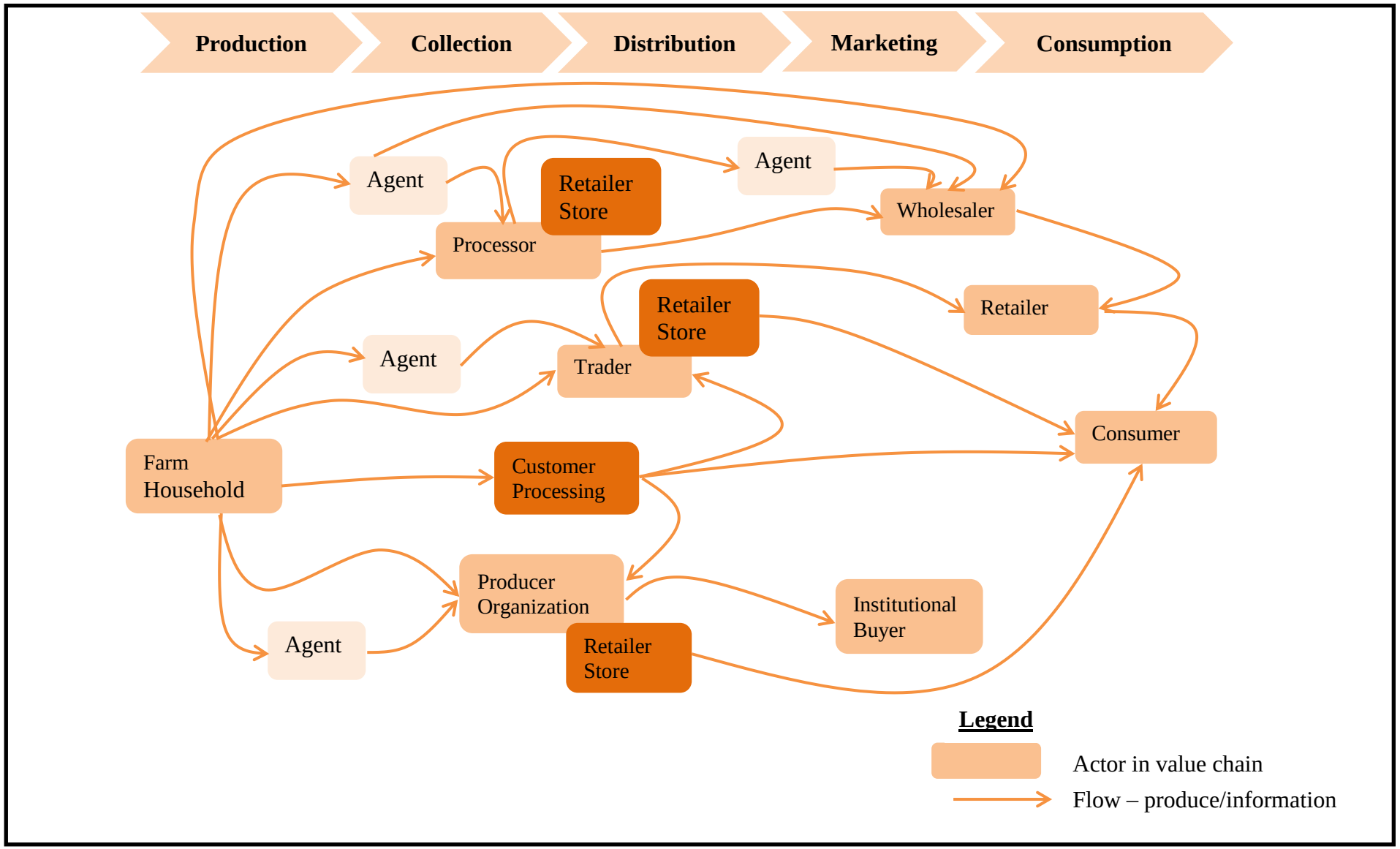


Figure 6: Agricultural value chain
Source: Own illustration based on survey

An agent may be a trader within the vicinity of smallholder farmers who purchases produce from farmers for selling to other traders or may be a middleman/intermediary who facilitates transactions between producers and traders on a commission basis. Agents facilitate the transactions of smallholder farmers selling their produce to traders, processors, wholesalers and producer organizations – i.e. traders purchasing produce from smallholder farmers; processors purchasing produce from smallholder farmers and selling processed produce to wholesalers; wholesalers purchasing produce from smallholder farmers and selling produce to retailers, and producer organizations selling produce from smallholder farmers and selling produce to institutions. Agents can also facilitate transportation and delivery of purchased produce.

Processing intends to add value to agricultural produce and may involve activities such as milling, packaging, and labelling. For example, maize grain may be milled into flour, packed into packs of 25 Kg for selling to traders, retailers and consumers. Likewise, rice may be milled and packed for selling to traders, retailers and consumers. Fig. 6 also indicates that consumers (i.e. final actors) may be served by different actors – e.g. retailers purchasing produce from wholesalers, traders; producer organizations; processors; and smallholders.

4.7.2. Agricultural Marketing Channels

Marketing of agricultural produce by smallholder farmers in the study areas follows a diverse set of channels involving a variety of actors. Four (4) types of marketing linkages are identified, analyzed and discussed in. The analysis is based on the trading parties, time of purchase and the relationship between the two trading parties.

(i) Harvest linkages

This refers to the marketing of agricultural produce by the farmer to other actors of the value chain, such as agents, traders, processors, retailers, wholesalers or producer organizations. According to Fig. 7, there is a range of marketing channels available to farmers, including traders, retailers, processors, wholesalers, producer organizations and their respective agents. In most cases, buyers visit the villages or homes of the smallholder farmers or nearby markets to smallholders for collecting and purchasing agricultural produce. These buyers actively search for farmers selling the produce, or sometimes they hire agents for assisting them (i.e. buyers) establish contacts with farmers. Units of measurements are usually based on the local agreed systems.

The selling procedure is that: once the buyer is satisfied with the sample of produce, grouping into categories is done and the corresponding price is established. The prevailing market price is taken into consideration when prices are set. Usually, farmers are paid in cash by buyers while selling their produce. Means of transportation from home to markets and storage facilities are usually organized by buyers themselves. Among the challenges that are identified include farmers' suspicious that traders use illicit methods to alter prices such as manipulation of weighing scales, and feeling of farmers that buyers have established price -

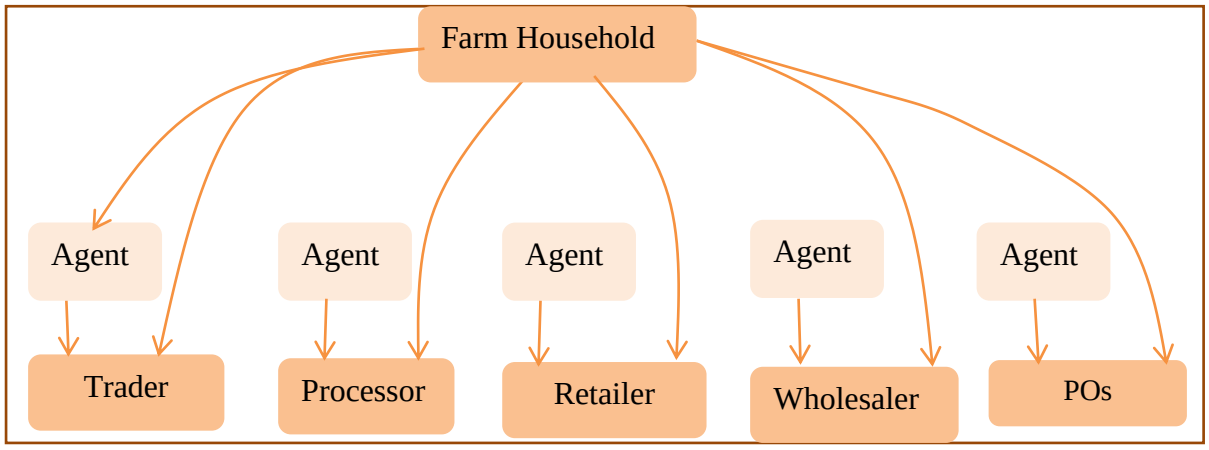


Figure 7: Harvest linkages

cartel by commonly agreeing among each other on an area-wide buying price. In other cases, unreliability and unavailability of buyers force farmers to return home with their unsold produce or rotting of produce like bananas. On the other side, buyers report the cheating of farmers by providing fake samples or selling less than their promised quantity. As these are local nearby markets to farmers, produce are sold after production and in most cases without processing. Processing of produce and access to town markets (district, regional) both may attract higher prices for agricultural produce. Poor roads to markets and lack of transportation means are among the factors constraining farmers to access town markets.

(ii) Aggregation linkages

This describes the step in the value chain where agricultural products are collected and accumulated but not processed. This usually happens immediately after agricultural produce have been harvested. For example, traders may visit villages in Kilosa where rice is grown abundantly or areas in Hai where bananas are grown, and stay there for a while, collecting the harvests from farmers. Fig. 8 indicates that linkage exists between agents who have acquired agricultural produce from several farmers for their clients (traders, processors, wholesalers and producer organizations). Traders and even producer organizations can also engage in

aggregating linkages and sell the produce they collect to processors and wholesalers. The selling procedure is that using the services of the agents, buyers advance cash to the hired agents who are responsible for procuring the specified amount of produce and of specified quality. Storage and transportation of produce are usually organized by the agents in cooperation with the buyers.

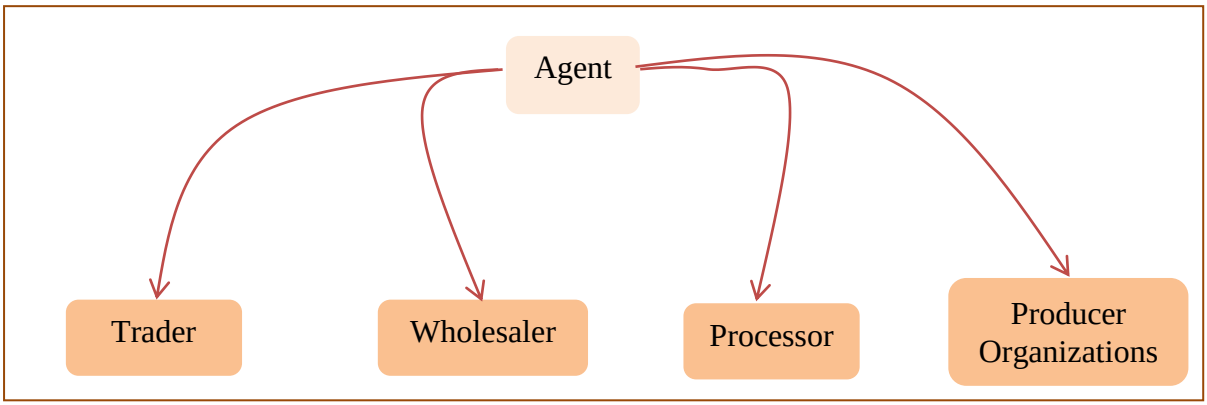


Figure 8: Aggregation linkages

Though farmers are not overburden by transportation and storage costs, this linkage does not assure farmers with physical access to markets. Access to markets would have some advantages to farmers. First, farmers may process their produce (e.g. maize to flour, paddy to rice) and thus add value to them for better price. Secondly, access to markets would have enabled farmers to sell their produce at prevailing market prices. Thirdly, physical access to markets would enable farmers to establish business relationship with more buyers and other farmers. Lastly, access to markets would have enabled famers to learn the requirements (e.g. quality, standard, processing) of buyers for specific products.

(iii) Processing Linkages

This refers to the sale of processed agricultural produce to wholesalers and retailers. Traders, processors and producer organizations (processing actors) are always searching for produce throughout the year and thus processing of agricultural produce is continuous. In this linkage (Fig. 9), produce processors and traders can sell to different wholesalers and retailers or producer organizations can sell processed produce to wholesalers and retailers either directly or through agents. During these transactions, buyers (i.e. wholesalers and retailers) negotiate prices based on the prevailing market prices and discount is considered for large quantity purchase. In this linkage, farmers are not involved directly, rather the produce they (farmers) sold are processed and sold. The key question to ask is how the farmer would have benefited if s/he is the one involved in this linkage as a seller of processed produce.

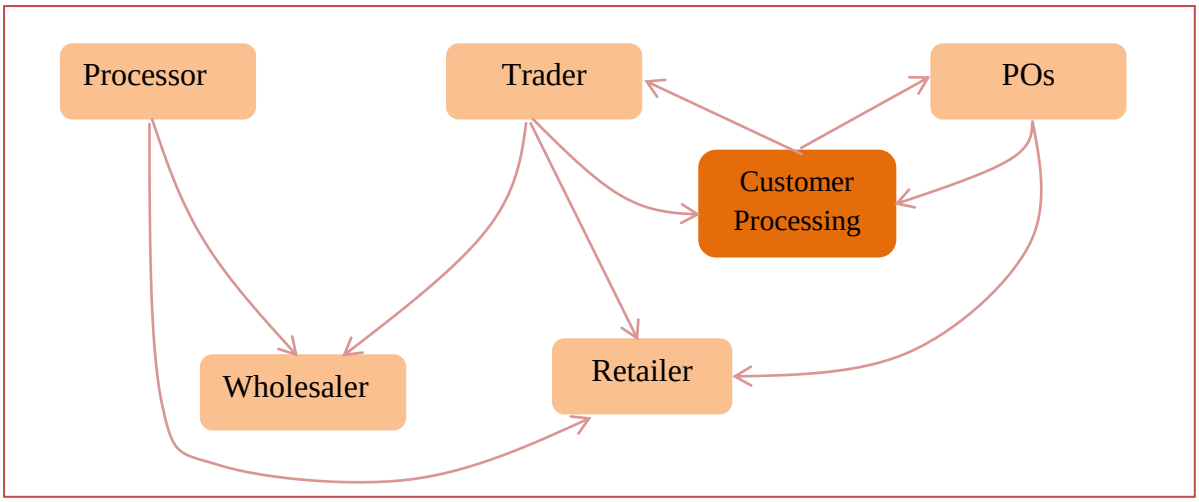


Figure 9: Processing linkages

(iv) Distribution Linkages

In this step in the value chain, the processed produce is sold to the end consumers by wholesalers and retailers. Other actors e.g. traders, processors and producer organizations despite being involved in other linkages, they do sell produce to end consumers indirectly. In this marketing channel (Fig. 10), consumers can purchase produce from retailers at the available nearby markets. Retailers can also arrange their businesses nearby main roads, bus

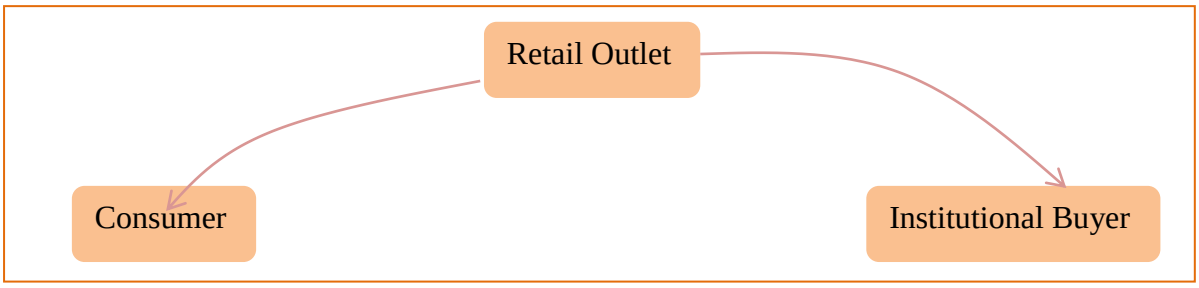


Figure 10: Distribution linkages

stands or across road junctions for selling to consumers. Other retailers move around streets with bicycles, motorcycles or cars promoting and selling their businesses (produce). Institution buyers include hospitals, schools, hotels, restaurants, shops, and supermarkets, and represent the kind of customers characterized by high buying volumes. As with processing linkages (in section (iii) above), smallholder farmers are not involved directly rather produce are in the hands of other actors in the value chain.

4.7.3. Weaknesses in the Agricultural Value Chain

Different actors are involved in moving agricultural produce from the producer to the end consumers. The longer the value chain, the higher the costs (transaction costs) incurred in

moving produce to the destination i.e. final consumer. Within the value chain, different difficulties can be identified that are encountered by smallholders when selling their produce. Some of the problems (i.e. weaknesses) are discussed here.

First, some agricultural produce (e.g. rice) are sold by farmers without processing to final consumable products. This has introduced traders who purchase raw products from farmers, process such produce and sell to other actors. There is a feeling that this is among the ways in which farmers are paid a little, leaving other actors benefiting more. Second, use of traditional weighing measures such as sacks and buckets is not appropriate. Traditional weighing techniques may be biased purposely to the advantage of the buyers. Uses of traditional weighing measures are encouraged in rural areas as a result of lack and unavailability of formal weighing measures. Third, the long value chain attracts more transportation and logistics costs and thus lowers the farmers' income. In this respect, costs are incurred in transporting products to town markets (i.e. district and regional markets). Forth, farmers have no access with markets. The value chain has indicated that smallholder farmers have no real access to markets. It is the other actors in the value chain who sell products to end customers. This lack of access to markets can be translated into losing income from sales of their (i.e. farmers) produce. Fifths, due to lack of agricultural market information, buyers of farm produce have the power of setting the price for the produce they purchase from smallholder farmers. The argument of the buyers is that they know the prevailing market prices. Lastly, lack of storage facilities at markets may hinder farmers from sending their produce to markets.

4.8. Challenges in Accessing Market Information

Access to agricultural markets by small-scale farmers is essential as it is translated to more gains by the rural farmers. This access may create a strong link among different actors in the value chain. Farmers may be linked to district, regional, national and even export markets. The linkage may enable rural farmers to increase agricultural production and thus generating economic growth in rural areas. Further, the linkage enables farmers to sell their produce at higher prices which in turn encourages farmers to invest in their own businesses and increase the quantity, quality and diversity of the crops they grow. More generally, the linkage and access to agricultural markets by rural farmers may stimulate investment, production and trade in agriculture by making agricultural market access conditions more transparent, predictable and competitive; establishing or strengthening the link between regional, national

and even international agricultural markets; and thus relying more prominently on the market for guiding scarce resources into their most productive uses both within the agricultural sector and economy-wide.

Table 11: Livelihood assets - constraints in accessing markets and market information

Human assets	Physical assets	Social assets	Natural assets	Financial assets
Illiteracy	Distance to markets	Availability of produce buyers or agents in rural areas	Poor roads	Unreliable markets
Poor or no education	Poor rural roads	Presence of middlemen	No reliable markets	Volatile and low produce prices
Lack of knowledge and experience	Lack of transports	Lack of producer organizations	Low prices for produce	Lack of capital
	Lack of storage facilities at markets	No market information	Monopsonistic marketing channels	High transportation costs
	Use of informal (traditional) measuring system	No reliable markets		

Access to markets by rural communities is an issue which is at head now. It is evident that rural farmers have little access to agricultural markets as compared to other market participants in the value chain like food suppliers, collectors and traders. A number of constraining factors can be identified, including physical access to markets; structure of the markets; and producers' lack of skills, information and organization. These challenges are discussed based on the SLA's indicators summarized in Table 11.

4.8.1. Human Factors

Human factors include skills, knowledge and experience an individual has on a certain aspect of his undertakings. Access to markets and market information also, require an individual to be literate and informational capable. Literacy skill, especially ability to read and write, is important in accessing agricultural information, interpreting information and using such information. Overtime, experience and knowledge are accumulated from an individual accessing markets and marketing information.

Results from Table 5 indicate that 23 (10.65%) respondents did not attend or complete primary education while 144 (66.67%) are standard seven leavers. Primary education (standard seven) is a basic and mandatory for children in Tanzania, though the move is to

make ordinary level secondary school education a mandatory to children. Illiteracy level (i.e. standard seven and below) may be a factor hindering farmers to access markets and marketing information. Illiteracy may limit smallholder farmers in entering legal trading contract, search for business partners, and even promote and advertise their products. Illiteracy may also be a factor that limits smallholder farmers into processing their produce to add value and thus attracting better prices. Also, illiteracy may limit smallholder farmers into communicating with other actors in the value chain, or even travelling to district, regional and other distant markets. As a result of all these, illiterate farmers may limit themselves to their local traditional markets and thus sell their produce to available local and visiting traders. Lwoga (2010) associated illiteracy to lack of ICT expertise, lack of awareness and inadequate skills on ICT. Others equated low usage of ICT to illiteracy (Kessy *et al.*, 2006; Kimaro and Sahay, 2007). Literate farmers are more aware of the benefits embedded in modern technologies and have greater abilities to decode new information, search for appropriate technologies to alleviate their production constraints, and analyse the importance of new technologies.

4.8.2. Physical Factors

Selling points of farm produce differ depending on the reachability by an individual farmer. There are street markets, weekly basis markets, markets that emerge near main roads, and formal markets. Farmers can also sell their produce at their farms or even at their homes (Table 9). Access to markets by small-scale farmers is affected by some factors including long distance to travel, poor rural road connecting to main roads, and lack of transportation. Table 9 reveals that most farmers sold their produce at home and nearby markets mostly because of failing to reach distant markets. For example, the nearby big maize market, Kibaigwa, is about 65km from Dumila in Kilosa and Mvomero, the most maize producing areas in Morogoro. Poor rural roads limit transportation of farm produce to markets (i.e. by farmers) where they can get better price. For example, farmers from Sonu and Mbweera villages in Hai district, indicated that they prefer to visit the nearest available markets, Kwa Sadala and Boma N'gombe markets, which are about 5-6 km from the two villages. In short, poor roads discourage farmers from sending their produce to markets, lead to high transportation costs (both to farmers and traders), and lead to uncompetitive, monopsonistic markets. Higher transportation costs lower the gain of farmers and raise the prices at which the produce are sold at the markets. Poor developed market infrastructure also is a factor

limiting its access by market participants like farmers. Most markets miss an important facility, storage facility, which can be used to store products for selling or after buying.

Another challenge that smallholders experience during the selling of their produce is lack of formal standard measuring equipment. This normally happens when selling their produce at their homes or in the fields. With this, usually produce are measured based on volumes using big sacks (locally known as "rumbesa") and not by weight (see Pic. 1). With rumbesa, the sacks filled with produce are closed using stitched top layer enclosing additional produce. There are complains that this traditional informal system of measuring produce favours buyers and that farmers are underpaid.

Another challenge that can hinder smallholders in accessing markets is lack of storage facilities at the markets. Most of the town markets are underdeveloped and thus have poor infrastructure that provide no storage facilities for produce (esp. large volumes). This requires a seller or a buyer to have an individual arrangement for storing his or her produce. This may discourage smallholder farmers in transporting their produce to town markets for selling.

Picture 1: Onion packed rumbesa

Usually town markets (in districts and regions) pull farm produce from different places/districts/regions. The supply to these town markets can be considered reliable and consumers enjoy crops varieties. Farmers in research areas supply their produce to Morogoro, Kilimanjaro, Arusha and Dar es Salaam markets. Thus, good roads, and availability of transport can facilitate the businesses between the markets in these regions and the rural areas.

4.8.3. Social Factors

Dependence of available local buyers and buyers visiting rural areas for purchasing agricultural produce also discourages rural farmers in sending their produce to markets. Some traders have established strong connection with rural producers to whom they purchase the produce. Traders also use agents (i.e. middlemen) in purchasing produce from farmers. Some of these middlemen are residents of the same villages as producers. The established linkage between producers and buyers (traders, middlemen) is strong such that produce can be purchased on credits.

Dependence of smallholder farmers to local and visiting buyers for purchasing their (farmers') produce introduces the problem of unreliable markets. The buyers may be a few or not available at all, and thus farmers may miss the markets where they can sell their produce. Missing or no buyers situation may be attributed by emergence of markets in other places, or decreasing quantity of produce. Also, this dependence may lead farmers to depend on available or visiting buyers for getting market information such as produce prices. Using information provided by these buyers may favour the buyers themselves while farmers remain underpaid.

Lack of producer organizations (i.e. farmer organizations or social networks) that can facilitate businesses between producers and buyers also limit access to markets and market information by producers. Through social networks, farmers can sell their produce collectively and at an agreed price or can even send their produce to markets with facilitations from their organizations. The social networks can provide to farmers information about markets, buyers, prices, and timing of selling. With scarce information sources and imperfect markets, social networks can facilitate the exchange of information, enable farmers to access markets on schedule. Social networks also can help to reduce transaction costs and increase farmers' bargaining power, helping farmers earn higher returns when marketing their products. This, in turn, can affect technology adoption.

4.8.4. Natural Factors

Natural factors can also be among the factors that hinder access to markets and marketing information by smallholder farmers in rural areas. For example, poor rural roads may not be passable during the rainy season. This is the case with the road connecting Sonu village to main road to Bomang'ombe market which is only passable on foot during the rainy season. In

most rural areas with poor roads, means of transport available during the rainy season are cow-pulled carts, bicycles, motorcycles, and tricycles. Another challenge that smallholders experience is lack of reliable markets for their farm produce. Unreliable markets result from the fact that buyers (traders, wholesalers etc.) visit different markets in different regions for purchasing produce and thus may be attracted by factors like available transports, good roads, low prices and quality of produce. Lack of reliable markets introduces the challenge of low produce prices to smallholder farmers. Lack of reliable markets introduces monopsonistic marketing channels - that is, many producers and only a few buyers dominating the channel for some of farm produce.

4.8.5. Financial Factors

Among the problems that smallholders identified, during the interview, as constrains to market access was unreliable markets, volatile and low market prices for their farm produce, lack of capital and monopsonistic marketing channels. With unreliable markets, smallholders explained their concern that they do not get a consistently fair or good price for their produce year round. Produce prices keep on fluctuating daily, across markets and regions. Consequences of unreliable markets include volatile and low produce prices farmers receive from buyers, and high transportation cost for sending produce to distant markets.

Lack of capital is another factor identified by smallholders as obstacle to market access for their farm produce. Capital can help smallholders to process, pack, label and even advertise their produce for selling. As a fact, capital can help to add value to farm produce and hence attract good prices. Capital can also help smallholders to transport their produce to markets where they can meet buyers instead of selling at their homes and local markets. Capital is also essential to smallholders in expanding their crop productions. But securing capital to smallholder famers has been a challenge for years in developing countries like Tanzania. Government support has not been reliable or not available, loans from financial institutions like banks have been very difficult to secure due to difficulties in conditions, and farmers' organizations are not financially capable to cater for many smallholders. A survey by Salami *et al.* (2010) in Tanzania between May and August 2010 revealed that about half of the total rural household income came from farming and that because of lack of collateral, most farmers are bypassed by banks and micro-credit institutions.

4.9. Consequences of Poor Access to Markets and Market Information

Poor access to markets and market information by smallholder famers has some consequences. Smallholders may fail to understand how markets work, reasons for price fluctuations at the markets, and market and produce requirements. Due to poor access to markets and market information, farmers may lack information on some important requirements for their produce, like quality and quantity, which are important in attracting produce buyers. Usually, at markets produce are graded and grouped based on their qualities. The higher the produce quality, the higher its price. Also, the scarce and more demanded products attract higher prices.

Also, poor access to markets and market information facilitates poor understanding and participation of the different processes in agricultural value chain by smallholder famers. As a result, smallholder farmers sell their produce unprocessed and use informal weighing techniques for measuring produce while selling. Also, poor understanding of agricultural value chain introduces middlemen during the selling of farm produce. Though middlemen are important in linking producers to markets and buyers, they lower the final prices the farmers receive while selling their produce. Poor understanding and participation of smallholder farmers in agricultural value chain benefit more other actors while underpaying producers.

Poor access to markets by smallholder farmers can lead to poor production of farm produce. Low gain by smallholder farmers from selling their farm produce may discourage them from investing more in agricultural production. Investment in agricultural production may involve use or purchase of agricultural machineries, adoption of best farming practises, expanding farm sizes and growing varieties of crops. Poor investment in agricultural production may lead farmers to continue practising subsistence farming.

Lack of communication technologies was also discussed as a factor constraining smallholder farmers in accessing markets and market information for farm produce. Several factors are attributed to poor access to market information by smallholder farmers as depicted in Table 12. Results from Table 8 suggest that ownership of radio and mobile phones has increased in rural areas. Results indicate that majority of small scale farmers preferred to use radio and mobile phones in accessing and distributing information. Unfortunately, these farmers own basic mobile phones and not Internet-enabled ones and thus this limits the promised access to instant messaging, the World Wide Web, streaming multimedia, and their participation in

social media. Results in Table 8 also reveal that farmers very rarely discuss marketing of their produce in village meetings and that access to newspapers and TVs is not widespread and is limited in rural areas. Results in Table 10 also reveal that rural farmers have no knowledge and access to computers and the associated technologies of the Internet. Table 12 depicts factors that limit respondents in accessing market information and communication media.

Table 12: Factors limiting access to media

Factors	Respondents (R)	Respondents (%R)
Lack of electricity	121	56.0%
Road conditions (rough, distance)	75	34.7%
Lack to afford communication cost	90	41.7%
Services unavailable	53	24.5%
Unfriendly program time	67	31.0%

Though Dumila village is nearby the main road and electricity is available, few houses surveyed had electricity. Majority of respondents from Sonu and Modia in Hai are connected to electricity. Rural farmers showed their concern that communication is expensive and thus fail to afford the associated costs. Communication services (e.g. Internet, telephony, TV broadcasts) are difficult to access or are unavailable in some rural areas. Scholars have also acknowledged factors hindering access and use of ICT in rural areas. Factors include limited ICT facilities, lack of institutional ICT policy, lack of efforts to generate local and relevant content, unreliable or no electricity, and low use of ICT by farmers due to high costs (Kessy *et al.*, 2006; Lwoga, 2010; Mwakaje, 2010).

In short, difficult access to markets and market information has many consequences to the economies of small-scale producers and other market participants. In short, it reduces their opportunities for generating income; it increases uncertainty and limits their choices. As a result, rural producers have limited marketing opportunities, which significantly reduces farm-gate prices and increased input costs. The incentives to participate in monetized agricultural economy are weakened, and thus smallholder farmers concentrate on subsistence farming rather than market-oriented production systems.

4.10. Expectation of Smallholder Farmers in Agriculture Marketing

Expectation outcomes of smallholder farmers in agricultural marketing and in agriculture in general, are many and diverse. These expectations signal the improvements in productivity

and performance outcomes in agriculture, and change in status or image of an individual. The improvements in agriculture are expected to enhance rural livelihoods and incomes, alleviate poverty, and lead to adoption of modern agricultural technology. To an individual smallholder farmer, improvements in agricultural marketing are expected to improve price incentives, liberalize markets to generate supply response and create well-functioning markets. Based on the expectations of smallholder farmers in agricultural marketing, different responses were recorded and categorized as below:

(i) Financial

- earn more income from agricultural marketing of the farm produce
- get a higher price from sales of farm produce
- ability to secure loans and credits
- improve household's livelihood

(ii) Knowledge

- Share, with others, experience and knowledge in agriculture and on agricultural marketing
- gain more farming knowledge and of modern agricultural farming

(iii) Production

- maximize the farm area
- more harvests from the farm
- production of quality farm produce to meet standards
- adoption of modern agricultural farming

(iv) Marketing

- sell to other markets aside from the nearby markets
- establish or join established marketing network of farmers
- sell to supermarkets, regional and international markets

(v) Social

- establish networks of farmers and traders for agricultural marketing purposes
- a high level of personal commitment in agricultural production
- develop or improve social status based on successes in agricultural production leading to agricultural marketing

(vi) Access

- improve access to markets and market information for agricultural products
- more access to agricultural inputs and agricultural processing tools

Based on the items listed above, it is clear that strategies and plans are required to ensure such improvements are attained for the development of the agricultural sector and the development of the nation at large. The next chapter will work more on this by developing mechanisms for linking smallholder farmers to markets and providing them with market information for their farm produce while selling. It is anticipated that, successes in agricultural marketing have an impact to agricultural production. Knowledge in agricultural marketing helps to identify more demanded agricultural products, prices of different products, markets for identified products and best planting time for maximum harvests.

4.11. Conclusion

Access to agricultural markets and agricultural market information remains crucial and involves different sectors like transportation and infrastructure development. For example, to have farm produce transported to markets, one need roads, transport and even storage facilities at the markets. Good roads assure availability of and reliable transports and lowers transportation costs. Thus, involvement and cooperation among different sectors can ensure access to markets and availability of agricultural market information which are important to farmers to make important sales decision and other decision related to agricultural production.

To have agricultural market information available to recipients like smallholder farmers, both public and private institutions can be involved. Communication and telecommunication companies are responsible for setting communication infrastructure in rural areas to ensure mobile phone and telephony services, Internet, and TV and radio broadcasts are available. Electrical power companies, TANESCO in Tanzania, are responsible to ensure rural areas are powered by electricity. Information and communication technology service providers and operators (e.g. establishment of tele-centres) can ensure communication access points are available in rural areas. Government can also spearhead initiatives to establish access points for information in rural areas and thus link smallholder farmers to market and market information.

Farmers may also benefit more when they are organized in their groups and association. These organized groups allow smallholder farmers to bulk produce, reduce costs through economies of scale and, most importantly, to strengthen their bargaining power with traders. Through the organized groups, farmers can collectively organize transportation to markets for

selling their produce. This can help them to negotiate better and bargain with market intermediaries, and larger and stronger traders.

Providing access to agricultural market information to smallholders need to be very tricky. This can involve collecting and customizing information to be specific to targeted recipients. Disseminating such information can use the technology which is readily accessible to the vicinity of targeted smallholders. For example, use of local radio in broadcasting agricultural market information of identified produce to targeted smallholders may be beneficial as radio broadcasts are widely available, trusted, and allows for prompt feedback.

It should be emphasized that ICTs are tools for solutions but not the solution in itself. Information and communication technologies are enhancers and facilitators, but still require human intervention and application for their success. For their success, ICTs need to be integrated in agricultural marketing activities of smallholder farmers who have much to offer. Still smallholder farmers will be required to interpret the information received from the technology, still smallholders will be required to act on such information for the success of the process. At the end, it will be realized that technologies do not replace human rather to facilitate human transactions.

Thus, access and use of agricultural market information among rural smallholder farmers is important. This can be facilitated by the increasing ownership, adoption and use of ICTs in rural areas. The next chapter, i.e. Chapter Five, will explore the strategies for accessing agricultural market information in rural areas. In doing so, Chapter Five will propose and develop a framework for accessing agricultural market information in rural areas.

CHAPTER FIVE

DISCUSSION AND DEVELOPING A FRAMEWORK FOR ACCESSING AGRICULTURAL MARKET INFORMATION

ABSTRACT

Access to markets and market information for farm produce helps smallholder farmers plan what to plant for maximum harvest and gain; decide timing for selling (where, when and to whom to sell) produce for maximum profit; and also plan for storage and transportation. With this, the study has developed a framework to link smallholder farmers to markets while providing them with market information for their farm produce. The framework exploits the structure-agency components of the Empowerment Framework and the elements or 'capitals' of the livelihood assets of the Sustainable Livelihood Framework. As an attempt to build capabilities (i.e. empowerment) of smallholder farmers in agricultural marketing, the study employed the Capability Approach to map issues and challenges identified in agricultural marketing to different aspects of the framework. Agencies and structures in the framework work to empower smallholder farmers in agricultural markets to achieve development outcomes. Empowerment requires different resources of smallholder farmers to be improved to develop their capabilities to achieve development outcomes. Issues pertaining to social and cultural, institutional, economic/financial, political, and technological aspects need to be worked on to ensure sustainable access to markets and use of market information by smallholder farmers. Different stakeholders (e.g. government, development partners, NGOs) can support the adoption and implementation of the framework components. The overall, is the development of smallholder farmers, improvements in rural livelihoods and the economies of the country at large.

5.1. Introduction

The potential impact of ICTs on development has recently been acknowledged by many scholars. Proponents of ICTs (Avgerou, 1998; Avgerou, 2008; Furuholt and Matotay, 2011; Heeks, 2002b; Melhem *et al.*, 2009) advocate that ICTs create new opportunities in economic, social and political arena for the poor in developing countries. Most literatures assume a causal link between ICTs and development and thus encourage ICT investments in developing countries. Literatures also assume the developmental contributions of ICT in social, economic and political aspects may be either direct or indirect. Avgerou (1998)

suggested that spread of ICTs are necessary in order to participate in the emerging global economy, but not adequate to create economic growth. Increased ICT production and use contribute significantly to economic growth and increases productivity, competitiveness, and growth (Qiang *et al.*, 2004). Information and communication technology has become the foundation of every sector of every economy, everywhere by reducing transaction costs, provide connectivity, increases choices, widen geographical scope of potential markets and channel knowledge and skills of all kinds (Kramer *et al.*, 2007).

In politics, ICTs might be used to help engage people in the democratic processes. ICTs contribute by helping people obtain information, engaging in deliberation and participating in decision-making (Oates, 2003). Information and communication technology represents the introduction of a new form of political relationship in which individuals in society, their representatives, social groups, social and political organizations, pressure groups, among others, can act directly over governments (Batista, 2003). The social impacts of ICTs include cultural reproduction, social integration and socialization (O'Donnell and Henriksen, 2002).

Critics of ICT for development take a pessimistic view and claim that due to existing socio-economic inequalities, ICTs will favour the privileged segments within the society and not reach the economically and socially disadvantaged individuals and groups. In a study on inequality in globalising informational economies by Burkett (2000), it can be concluded that there is no direct relationship between access to information (using ICT) and development. Burkett (2000) noted that people erroneously assumed that access to information (by poor using ICT) makes them information rich, enriches people's lives and help to solve world's problems. Thus, uneven access to ICT will lead to a widening of the socio-economic gap within developing countries.

The diffusion and use of ICTs can even be witnessed in developing countries and low-income communities. This adoption has led many developing countries to increasingly adopt ICT for achieving enhanced socio-economic development (Waema and Odedra Straub, 1996). Kling (1996) and Splettstoesser and Kimaro (2000) believed that there is a direct social and economic value of ICT. Avgerou (1995) argued that ICT use can improve productivity, increase efficiency of operations and effectiveness, strengthen management and administrative functions, improve market performance and increase business competitiveness. Samaranayake (1998) recognized ICT as a means to achieve more efficient socio-economic development in the developing countries. A study on ICT usage and impacts

on profitability of small and medium enterprises (SMEs) in 13 African countries reported that ICTs are significant input factors for both formal and informal SMEs and contribute positively to revenue generation and ICT use increases labor productivity (Esselaar *et al.*, 2006).

A study by Mwakaje (2010) in rural Tanzania concluded that ICTs usage has a greater impact on agricultural marketing activities. The study results showed that use of ICTs to access market information can assure farmers better prices for which in turn has an effect on poverty alleviation (Mwakaje, 2010). Another study by Lwoga (2010) reported that access to information can bridge both the knowledge and information gaps and contribute to agricultural growth. Also, information and communication technologies have the potential of improving the health sector by delivering health care services (Kimaro, 2006). In health sector ICTs can improve dissemination of public health information; enable remote consultation, diagnosis and treatment through telemedicine; facilitate collaboration and cooperation among health workers, including sharing of learning and training approaches; etc (Kimaro, 2006; McConnell *et al.*, 2006). Thus, developing countries can invest in ICTs and tape the opportunities provided by ICT to overcome the problems of rural poverty, inequality, and environmental degradation. In short, ICTs facilitate economic development by availing information to make choice of development priorities easier and to plan and manage development activities better (Waema and Odedra Straub, 1996).

Due to its contribution on development, scholars have called for much deeper understanding on the relatioship between ICT and development (Burkett, 2000; Heeks, 2002b). Such understanding may be based on well-conceptualized evidence which are rigorously-researched (Burkett, 2000; Heeks, 2002b; Selwyn, 2003). The contribution of ICTs on socio-economic development and peoples‘ lives can be understood better by analysing how an individual ICT is amenable to the particular local socio-economic, political, and cultural context in which it is being inserted (Gigler, 2011). With this, Heeks (2002a) noted that emphasizing the concept of digital divide to technology has drawn attention from other divides and inequalities that hamper development to the poor. Heeks (2002a) stressed the integration of ICTs into projects driven by developmental objectives rather than by technological concerns.

Community informatics emerges as an area with great contributions and impacts on the economic, political and social releams of daily life (O'neil, 2002). Gurstein (2003) refers to

community informatics as an approach that links community development efforts with the opportunities that ICTs present. community informatics includes areas such as electronic commerce, community and civic networks, community technology centres, electronic democracy, cultural enhancement, and online partcipation (Lentz *et al.*, 2000). Researches in community informatics bring togethers theories of information and communication technologies with pragmatic field of community development (Pitkin, 2001; Romm and Taylor, 2000). Most scholars focus on the changes and effects brought by utilizing ICTs rather than devoting efforts to ICTs access.

To integrate ICTs into projects with development objectives, a concept of "Effective Use" introduced by Gurstein (2003) can be applied. Gurstein (2003) defined "Effective Use" as the capacity and opportunity to successfully integrate ICTs into the accomplishment of self or collaboratively identified goals. This concept emphasizes that people can derive real benefits from ICTs depending on the way peoples are making use of ICTs in their daily lives and how well they have integrated ICTs into their social, productive and cultural activities. When discussing effective use of ICTs in enhancing learning, Blackmore *et al.* (2003) stresses that ICTs need to be integrated in all learning processes for best outcome. Another scholar, Yelland (2001), concluded that the effective use of ICT in schools not only influences learning outcomes in terms of the quality of work produced by students but also predisposes them to engagement with ideas and affords them the opportunity to learn in new and dynamic ways that were not possible without the technologies.

Despite of their differences in contribution of ICTs to development, scholars have focused their researches into the impact of ICTs in social, economic and political contexts. These scholars emphasizes that ICTs can positively or negatively impact the people's lives and that their impact will depend on the social and local context in which ICTs are being inserted/applied.

This study has considered the 'people-centred' approach to development in developing the framework for linking rural farmers to markets for their farm produce. The people-centered appoach to development is an approach to international development that focuses on improving local communities' self-reliance, social justice, and participatory decision-making (Korten, 1984; Korten and Klauss, 1984). It recognizes that economic growth does not inherently contribute to human development and calls for changes in social, political, and environmental values and practices. The approach identified two important themes for its

planning: (a) supporting and building from the self-reliant efforts of the poor to address their own needs, and (b) implicit recognition that while the modern sector is the primary source of conventional economic growth, the traditional sector is the primary source of livelihood for most poor households and that the two sectors are in competition for resources (Korten and Klauss, 1984). These themes have helped to distinguish between a simple employment strategy and a people-centered employment strategy - one normally focuses on expansion of the modern economy, the other builds on the strengths of the traditional or "people's" economy (Korten and Klauss, 1984). People-centered development puts the needs of the people at the heart of development (António, 2001).

An ICT framework for linking rural farmers to markets based on people-centered approach to development, will be developed by attempting to operationalize Amartya Sen's capability approach and the Empowerment framework by Alsop and Heinsohn (2005). The framework will also employ some elements from the sustainable livelihood framework (SLF) (DFID, 1999) discussed in section 4.4.3. The essence is to empower rural farmers to access agricultural markets for their produce by improving their access to agricultural market information and knowledge facilitated by ICTs. Scholars (Alampay, 2006; Gigler, 2011; Johnstone, 2007; Zheng and Stahl, 2011) have argued that use of ICTs improves people informational capabilities and ultimately expands people's human and social capabilities. To understand better how information can empower individual for development, a better understanding of the capability approach by Sen is required.

5.2. Capability Approach

The Capability Approach is defined by its choice of focus upon the moral significance of individuals' capability of achieving the kind of lives they have reason to value (Sen, 1993). It is distinguished from more established approaches to ethical evaluation, such as utilitarianism or resourcism, which focus exclusively on subjective well-being or the availability of means to the good life, respectively (Decancq *et al.*, 2014; Sen, 1993). Sen (1993) defined a person's capability to live a good life in terms of the set of valuable 'beings and doings' like being in good health or having loving relationships with others to which they have real access. The Capability approach is used in a wide range of fields, most prominently in development studies, welfare economics, social policy and political philosophy (Robeyns, 2005a). It can be used to evaluate several aspects of people's well-being, such as inequality, poverty, the well-being of an individual or the average well-being of the members of a group (Robeyns,

2005a).

The core characteristic of the capability approach is its focus on what people are effectively able to do and to be; that is, on their capabilities (Robeyns, 2005a). Based on the capability approach, Amartya Sen (1999) defined development as a process of expanding the real freedoms that people enjoy to lead the lives they have reason to value. Sen's understanding viewed development as freedom of choice.

5.2.1. Functionings and Capabilities

Amartya Sen argues that human development should be viewed first and foremost as a process of expanding people's capabilities (Gigler, 2011). What matters, according to Sen, is what people are capable of being, or doing, with the goods to which they have access (Gigler, 2011). The major constituents of the capability approach are ''functionings'' and ''capabilities''. Functionings are the ''beings and doings'' of a person, whereas a person's capability is ''the various combinations of functionings that a person can achieve. Capability is thus a set of vectors of functionings, reflecting the person's freedom to lead one type of life or another'' (Sen, 1992). According to Sen (1987), the two concepts are distinct in that a functioning is an achievement, whereas a capability is the ability to achieve. Functionings are, in a sense, more directly related to living conditions, since they are different aspects of living conditions. Capabilities, in contrast, are notions of freedom, in the positive sense: what real opportunities you have regarding the life you may lead. The relations between functions and capabilities are complex and Sen (1987) explain:

> Living conditions are, in a sense, states of existence - being this or doing that. Functionings reflect the various aspects of such states, and the set of feasible functioning bundles is the capability of a person. But among the beings and doings are activities of choosing, and thus there is a simultaneous and two-way relationship between functionings and capabilities. It is, of course, true that once the functionings have been suitably richly characterised, then we can again ask the question: What alternative 'refined' functioning bundles are open to this person? But in the process of getting to that point, considerations of alternative functionings (and thus of capabilities) have already been taken on board.

The capability approach developed by Sen (1987; 1992; 1993; 1999) argues that development

is about the freedom of choice in the personal, the social, the economic and the political sphere. The focus of development is increasingly a person's capability set, or his/her substantive freedom, to lead the life he/she values. Based on the distinction between functionings and capabilities, the capability approach differentiates from other economic approaches to poverty, inequality, and justice by distinguishing "means to achieve" (what one values), "freedom to achieve," and "actual achievement" (Sen, 1990; 1992). Whereas approaches that focus on commodity demand or level of income only address the means of achievement, the capability approach puts the freedom to achieve at the central stage of assessment.

5.2.2. Operationalising Sen's Capability Approach

To understand the contribution of ICTs to development, a clear understanding of the working context and development processes is required. This is an attempt to operationalize the Capability Approach to development using ICTs. In translating the Capability Approach to development processes using ICTs, a framework will be developed to link rural farmers to markets and market information. The Capability Approach can be combined with other theoretical approaches during its operationalisation. A number of scholars (Bebbington, 1999; Fukuda-Parr, 2003; Zheng, 2009) have attempted to operationalize the capability approach and thus contributed to considerable literature. Bebbington (1999) integrated the capability approach into the sustainable livelihoods framework and then developed his own version based on capitals (assets) and capabilities. Almira (2002) took Sen's capability approach forward to develop a framework for specifying valuable capabilities, applied it to case studies of non-governmental organization activities on poverty reduction. Some scholars have attempted to operationalize the Capability Approach by integrating it with other developmental approaches as will be seen in some cases in the following sections.

(i) Alsop and Heinsohn's Empowerment Framework

A work by Alsop and Heinsohn (2005) to the World Bank can be considered as an attempt to operationalize the Capability Approach. The World Bank Development Report of 2000/2001 recognized empowerment as among three pillars of attacking poverty. In their work, Alsop and Heinsohn (2005) defined Empowerment as enhancing an individual's or group's capacity to make choices and transform those choices into desired actions and outcomes. Alsop and Heinsohn (2005) go on explaining that an empowered person or group possesses the capacity to make effective choices; that is, to translate their choices into desired actions and outcomes.

ICT is considered as a means through which choices can be made available to an individual or group and thus is very important in the empowerment processes.

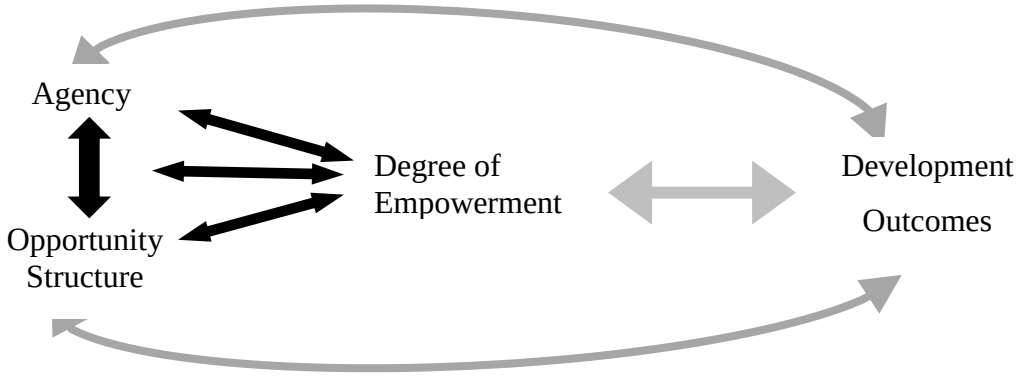


Figure 11: Relationship between outcomes and correlates of empowerment
Source: Alsop and Heinsohn (2005)

Alsop and Heinsohn considered agency and opportunity structure as influencing the capacity to make a choice. They defined agency as the ability of an actor to make meaningful choices while opportunity structure as formal and informal context within which the actors operate. They associated agency and opportunity structure to the degree of empowerment a person or a group experiences. The different degrees of empowerment are existence of choice, use of choice and achievement of choice. Alsop and Heinsohn listed the individual agencies (i.e. individual asset endowment) without defining them as psychological, informational, organizational, material, social, financial and human.

An actor's opportunity structure is shaped by the presence and operation of formal and informal institutions, or rules of the game including the laws, regulatory frameworks, norms and customs governing people's behaviour which in turn determine whether individuals and groups have access to assets, and whether these people can use the assets to achieve desired outcomes.

Alsop and Heinsohn built an empowerment framework (Fig. 11) which connects 'individual agency' with an 'opportunity structure' from which follow the degree of empowerment an individual must achieve development outcomes.

(ii) The Sustainable Livelihood Framework

The Sustainable Livelihood Framework in Fig. 5, developed by the Sustainable Rural Livelihoods Advisory Committee, is a tool for improving our understanding of livelihoods, particularly the livelihoods of the poor (DFID, 1999). The SLF helps to understand in a

systemic way the elements influencing the lives of the poor and also presents the main factors that affect people's livelihoods, and typical relationships between these. The framework can be used in both planning new development activities and assessing the contribution to livelihood sustainability made by existing activities. Parkinson and Ramirez (2007) used the SLF to assess the impact of ICT to development and Duncombe (2006) demonstrated how the SLF can be applied to ICT4D research with microenterprises. The focus of these researches (i.e. Duncombe, 2006; Parkinson and Ramirez, 2007) was on poverty reduction through economic growth.

The livelihood framework identifies five core asset categories or types of capital upon which livelihoods are built namely Human capital, Social capital, Natural capital, Physical capital, and Financial capital (DFID, 1999). People-centred analysis is most likely to begin with simultaneous investigation of people's assets, their objectives (the Livelihood Outcomes which they are seeking) and the Livelihood Strategies which they adopt to achieve these objectives. The framework also provides important feedback between its different components.

The livelihoods approach is founded on a belief that people require a range of assets to achieve positive livelihood outcomes; no single category of assets on its own is sufficient to yield all the many and varied livelihood outcomes that people seek (DFID, 1999). The assets or 'capital' or 'personal endowment' can be operationalized in different ways. In its analysis, human capital can be expanded and disaggregated to education, information and health elements. Both formal education and existing local knowledge are important in analysing the human asset. Human health can be assessed based on variations. Based on the livelihood approach, social capital is taken to mean the social resources upon which people draw in pursuit of their livelihood objectives (DFID, 1999). Levels of social capital are hard to gauge so as their quantification. Natural capital describes natural resource stocks from which resource flows and services useful for livelihoods are derived. Physical capital comprises the basic infrastructure (i.e. the physical environment) and producer goods (i.e. the tools and equipment) needed to support livelihoods. Financial capital denotes the financial resources that people use to achieve their livelihood objectives.

In a SLF, individuals possess the livelihood assets with which they influence the transforming structures and processes. The individuals operate within the vulnerability context and develop livelihood strategies which may result in livelihood outcomes. The goal of SLF is to help

poor people to achieve lasting improvements against the indicators of poverty that they themselves identify, and from a baseline they define. The Livelihood Outcomes component of the framework is a hybrid, combining the aims of both DFID and its clients. Livelihood outcomes may conflict. For example, increased income may conflict with natural resources; prioritizing different livelihood objectives may contradict groups (e.g. reducing vulnerability vs maximizing income). Department for international development, through the SLF, also sought to promote sustainable livelihoods. The livelihood outcomes of the SLF are more income, increased well-being, reduced vulnerability, improved food security, and more sustainable use of natural resources base.

The sustainable livelihood approach is an example of the 'multiple capital' approach and considers sustainability in terms of available capital and an examination of the vulnerability context (trends, shocks and stresses) in which these capitals (or assets) exist (Morse and McNamara, 2013). All capitals are important though the extent of their importance will change from household to household and over time (Morse and McNamara, 2013). Bebbington (1999) noted that people may sacrifice some capital for others if they deem it more appropriate for livelihood, and that switching may reverse at another time. Morse and McNamara (2013) described that the five capitals comprised in the SLF are not definitive and are open to debate. Serageldin and Steer (1994) suggested that there are four types of capital that need to be considered in sustainability: human-made capital, natural capital, human capital and social capital. Some have considered the inclusion of spiritual capital, distinct between social and human capital, which encapsulates the benefits to society provided by spiritual, moral or psychological beliefs and practices. A study by Odero (2006) extended the SLF to include the sixth capital, information capital, and defined it as different kinds of data endowed with relevance and purpose used by people to make decisions in pursuit of their livelihood objectives. Inclusion of spiritual capital, distinct from social and human capitals, has been suggested though it can appear as a subset of social capital (Morse and McNamara, 2013).

Also, there are some arguments that capital within SLF be considered on how it can help people engage with others and how such engagement can provide for all (Morse and McNamara, 2013). Bebbington (1999) explained that capitals or 'assets' should also give meaning to the person's world and should not only act as means through which they make a living. With this, Morse and McNamara (2013) defined 'capital' as a means by which people can "engage more fruitfully and meaningfully with the world, and most importantly the

capability to change the world". Bebbington (1999) suggested that capitals take on three distinct roles: vehicles for instrumental action (making a living), hermeneutic action (making living meaningful), and emancipatory action (challenging the structures under which one makes a living). Another study by Scoones (1998), among others, identified religion and culture as livelihood capitals.

(iii) The Capability, Empowerment and Sustainability Virtuous Spiral Model

Using the Capability, Empowerment and Sustainability (CES) virtuous spiral model (Fig. 12), Grunfeld (2011) explored how an ICT4D project deployed in a community or a few communities can contribute to *C*apability development of an individual, *E*mpowerment of an individual and *S*ustainability of the project. Grunfeld (2011) posits that individuals and communities can use ICT to build and extend CES, which in turn might improve their ICT infrastructure (technologies and skills). Further, the infrastructure would in turn enhance the CES (i.e. mutually reinforcing relationships).

The model describes a virtuous spiral dynamic between the use of ICT and the increase of capabilities, empowerment and sustainability. Depending on the type of ICT, individuals and communities require a minimum set of capabilities to gain access to and make effective use of ICT. Basic ICT training (skills development) and awareness creation can enhance individuals' confidence (i.e. to empower them) to control their lives and improve the ICT infrastructure and make their effective use. According to Grunfeld (2011), each twist of the spiral in Fig 12, brings new insights and improved capabilities, thereby strengthening communities, by enabling individuals to improve knowledge in areas such as health, agriculture and governance.

The four constructs of the model are ICT, capability, empowerment and sustainability. Access to ICT represents a commodity, knowledge for its use represents a capability, and its application by using a resource (e.g. sending an email) is a functioning. Essentially, empowerment removes barriers to individuals and provides opportunities for an individual to improve his/her capabilities. The model depicts sustainability as having a broader focus and for externally funded projects, being able to continue beyond the funding period. Thus, implementing such a framework by Grunfeld (2011) means extending the project period for a number of years as some benefits may disappear in a short time, some impacts may be evident after a while, and some changes will become evident over time.

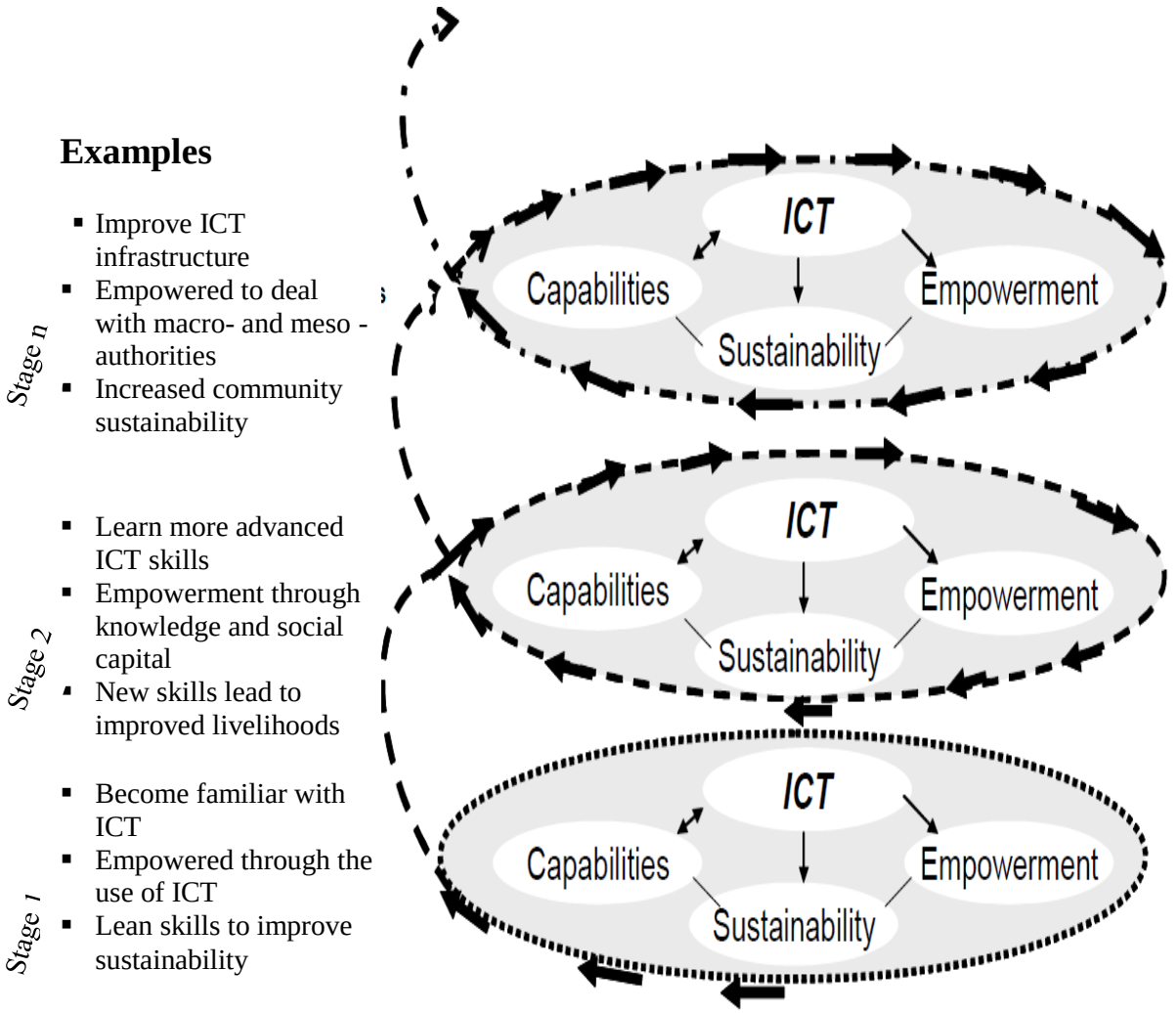


Figure 12: The Capability, Empowerment and Sustainability virtuous spiral Model

Source: Grunfeld (2011)

(iv) The Capability Approach Framework by Hatakka and De

Hatakka and De (2011) considered technology as a commodity which can influence the individual's or community's ability to make a choice and thus gave it an integral role by developing the 'Capability Approach Framework' (Fig. 13). They focused on the difference between potential and achieved functionings, role of technology, and the importance of context while developing their framework to evaluate the development goals of ICT4D initiative projects. Hatakka and De considered technology as a commodity and added that it is its use that can foster and enable development. They also added that technology introduction should be accompanied with supporting functions (e.g. training) and infrastructure improvement (e.g. electricity). These scholars insisted that in analysing technology as a means to enabling functionings we must therefore focus on the features within the technology that can enable capabilities, what supportive features that are needed and the supportive environment (i.e. conversion factors).

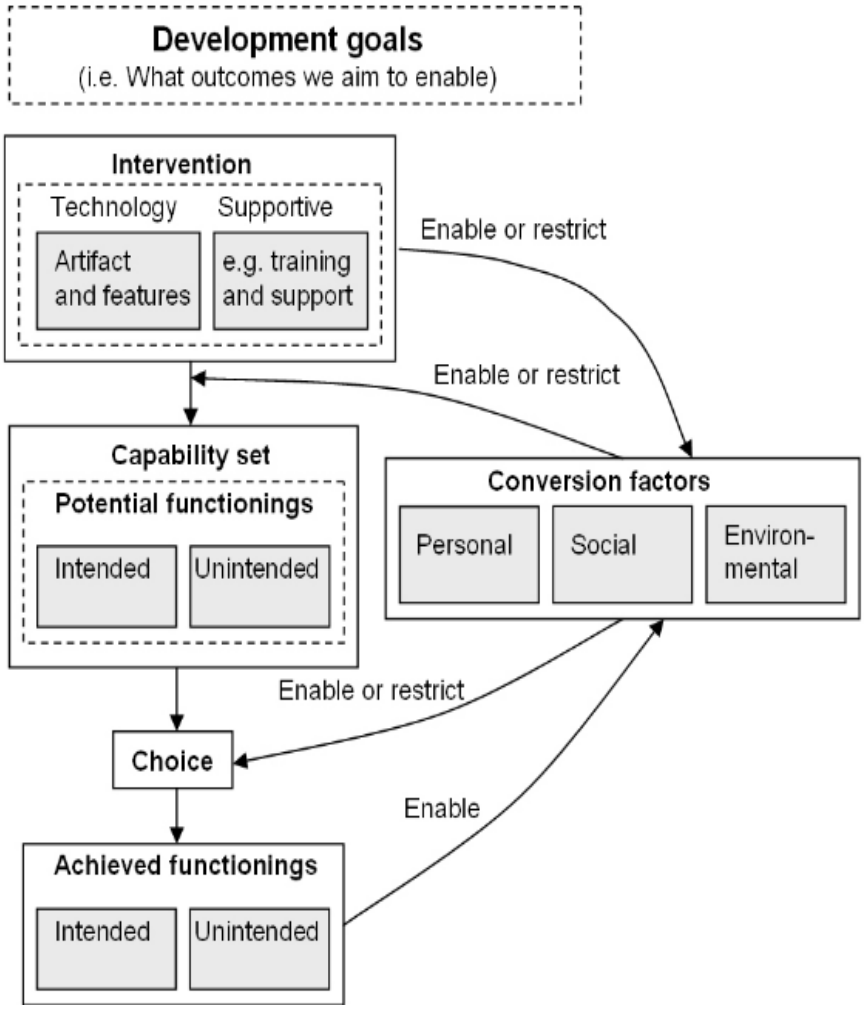


Figure 13: The capability approach framework

Source: Hatakka and De (2011)

The framework was used to evaluate the enabling of people's intended and unintended functionings, through the ICT initiatives (i.e. what people can potentially do or be following the intervention). Conversion factors (i.e. personal -gender, literacy etc., social - laws, public policies etc. and environmental - infrastructure, resources etc.), choice and outcome of their choices may hinder the translation of the potential functionings into achieved functionings. Therefore, the Capability Approach Framework by Hatakka and De includes the interplay between potential functionings, choice, conversion factors and achieved functionings.

Hatakka and De applied their framework in Bangladesh to evaluate development goals of ICT initiatives by investigating achieved functionings and choice that follow from potential functionings and are influenced by conversion factors.

(v) ICT4D Evaluation Model by Kivunike

Kivunike *et al.* (2014) proposed an ICT4D evaluation model which includes ICT

characteristics (i.e. communication, production, processing and distribution of information), conversion factors, opportunities/capabilities, and achievements (choice, personal or community goals, and achieved functionings) as shown in Fig. 14. Opportunities provided by resources enabled by ICT characteristics can be limited by personal, social and environmental factors. Conversion factors influence the interaction between the provision of opportunities and the choice. Improving the ability to make choice enables the choice of capabilities so that one lives the life he/she values. The scholars considered outputs as opportunities and outcomes as achievements. The proposed model evaluates choice as achievement.

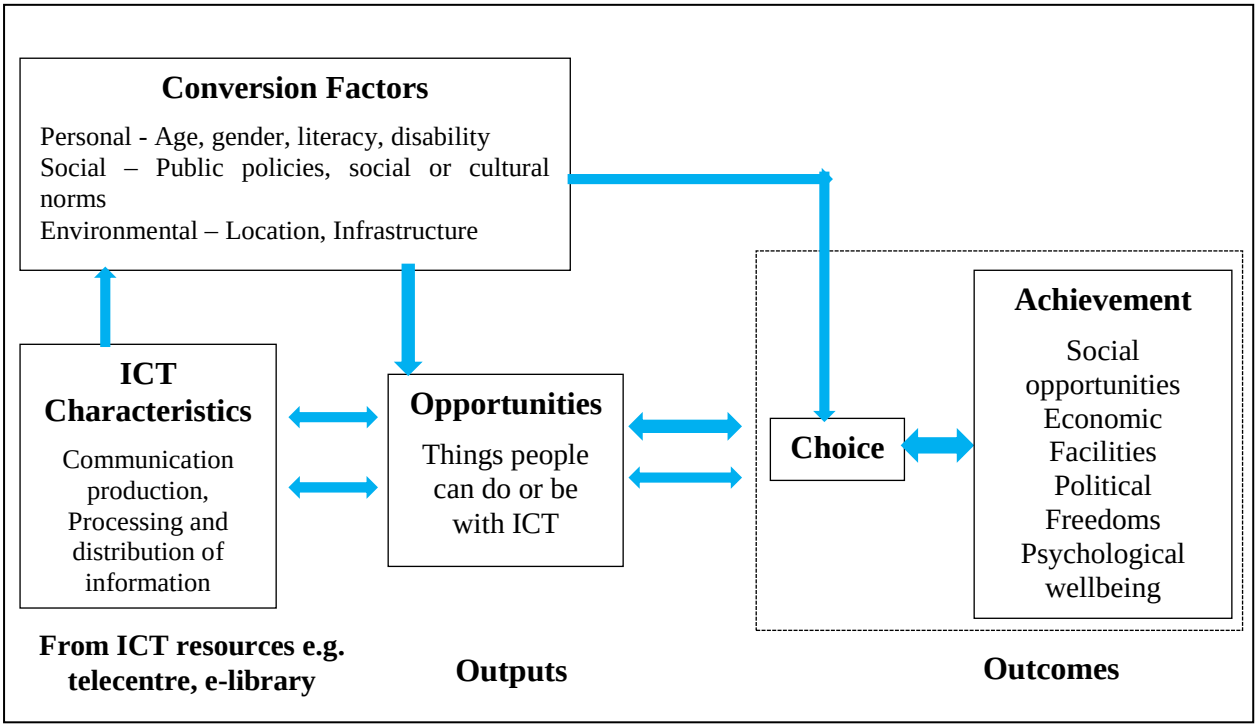


Figure 14: ICT4D evaluation model

Source: Kivunike *et al.* (2014)

The achievements of the proposed model by Kivunike *et al.* (2014) include social opportunities (i.e. arrangement for one to live better life), economic facilities (i.e. opportunities to utilize resources for consumption, production or exchange), political freedoms (i.e. opportunities people have to exercise their political rights), and psychological wellbeing (i.e. physical, emotional and personal development opportunities).

(vi)A 5-Step Process - ICT Impact Chain

Gigler (2011) developed the ICT impact chain based on the Alternative Evaluation Framework (AEF) depicted in Table 13. The essence of Gigler's study was to explore the conditions under which the improved access to information and knowledge facilitated by

ICTs can enhance the individual and collective capabilities of the poor to achieve the lifestyle they value. Gigler introduced information as an additional asset or capital into the Sustainable Livelihood Framework. This inclusion is based on the role that information and knowledge have to development of the poor and their right to information as entitled. To evaluate the role of information and ICTs in the livelihoods of the poor, it is crucial to understand the inter-linkages between informational capital and all the other capitals.

Gigler's ICT Impact Chain (Fig. 15) describes the impact of access and use of ICTs on peoples' well-being and development. The process is based on five steps outlined below:

- Information needs assessment – to strengthen existing information capital, to identify critical barriers and bottlenecks that cause communication gaps, and to sustain information capital
- Assessment of people's ability and skills to use ICTs
- Conditions for transforming and converting ICT use into meaningful use
- Analysis of conditions for meaningful ICT use by individuals to be translated into enhancement of his/her informational capabilities, and
- Investigation of the extent to which informational capabilities can enhance human and social capabilities of individuals.

The important critical factor which determines the impact of ICTs on the well-being of the poor people is the extent to which ICT programs have succeeded in enhancing their informational capabilities. Gigler (2011) differentiated the concepts of ICT capabilities versus informational capabilities. Information and communication technology capabilities encapsulates a person's ability to make efficient use of computer hardware, software, and ICT tools while the concept of informational capabilities is an information-centric approach, deemphasizing the role of technology and people's ability to use these tools (Gigler, 2011). Further, Gigler described that information capabilities consisted of interdependent concepts of ICT capability; information literacy (i.e. how to use information); communication capabilities (i.e. skills to communicate effectively) and content capabilities (i.e. skills to produce and share local contents over the network).

The role of intermediary organizations in introducing ICTs to local communities was also hinted by Gigler. Gigler categorized intermediation as either ICT, or technical intermediaries or social intermediaries. Information and communication technology intermediary (e.g. non-governmental organization, local government, or international donor) is a specialized

Table 13: Empowerment through ICTs framework

Context		Livelihood Resources		Institutional Processes		Capabilities		Livelihood Outcomes
Socio-Economic Conditions Informational Demographics strengthened		Economic/financial capital Natural capital		Existing social structures Level and degree of	<=>	<u>Individual</u> Psychological Social Economic Informational Political Cultural	<=>	Informational capabilities strengthened
Cultural Context	<=>	Human capital	<=>	ICT intermediation				
Political Context ICT diffusion ICT policy Framework		Social capital Informational capital			<=>	<u>Collective</u> Social Economic Political Organizational Cultural Informational	<=> <=>	Human Capabilities strengthened Social Capabilities strengthened
<u>Stages of ICT Project</u>								
Existing Information Systems and Environments		Assess needs Information capital		Community ICT Access Local and relevant content Capacity-Building		Local Appropriation and Meaningful Use of ICTs		Ownership Sustainability

Source*:* Gigler (2011)

organization from outside the community while a social intermediary is defined as a local institution, like a community-based organization which assists in embedding ICTs to local communities (Gigler, 2011).

Acquired informational capabilities act as agents for change for individuals and communities, enhancing their abilities to engage with the formal institutions in the economic, political, social and cultural spheres of their life. Enhanced informational capabilities are essential catalytic agent strengthening individuals' capabilities in multiple dimensions of his or her life.

5.2.3. Commonalities and Differences among the Models

A thorough analysis indicates that the models/frameworks emanate/evolve from the Empowerment Framework by Alsop and Heinsohn (2005) and are founded based on the Capability Approach. The ultimate of the processes in the models/frameworks is to empower individuals to be capable in their dealings. The commonality is centred in the idea of enhancing an individual's ability, navigating a certain intervention using a resource/agency, and enabling individual to grasp opportunities and make good choices to reach development outcome.

Both works by Hatakka and De (2011) and Kivunike *et al.* (2014) base their models on the concept of expanding human capabilities of individuals and communities, and functionings being key to development outcome. Using the ICT impact chain, Gigler (2011) evaluated the impact of ICTs to individuals and communities in terms of the capabilities expanded and the well-being enhanced. A clear analysis indicates that ICTs provide '*options'* for individuals to choose from during the expansion of human capabilities and working towards achieving functionings. Thus, some frameworks/models also include the concept of choice as development outcome.

The models/frameworks have identified and included components/elements that are necessary in processing the inputs to outputs (i.e. expanding human capabilities and achieving functionings). Though, some frameworks have assumed that technology is available within the individuals' or communities' environment and also did not include important characteristics/factors of individuals and communities that hinder technology adoption. This assumption has led into exclusion of conversion factors which facilitate technology utilization and adoption. To make technology usable in some rural areas in

developing countries including Tanzania, electricity plays a vital role, the same as the role that roads play in transportations. Personal characteristics that may play a role in technology utilization include physical abilities/disabilities, motivation, age, gender, language and education level. Other external factors such as community settings, public policies, social norms, discriminating factors, push by agencies (e.g. intermediation by non-governmental organizations, development partners etc.) may promote technology use and adoption among individuals and within the community. Thus, it is argued that a framework should cater for various enabling factors for technology adoption by considering the 'real environment' of the individuals and communities. Opportunities that emerge from the application of technology (i.e. potential functionings) and the outcomes that are seized after exploiting the opportunities presented by technology (i.e. achieved functionings) do differ. Kivunike *et al.* (2014) differentiated between outputs and outcomes (achieved functionings) which they regarded as opportunities. To investigate in a more formal way the benefits of using information systems (i.e. ICTs), Ward and Daniel (2006) suggested to include objectives of doing new things, doing things better, and stop doing things and establish whether benefits are measured or not. Ward and Daniel (2006) noted that ICT projects deployed in communities are unstructured and unorganized when compared with ICTs utilization in businesses and that ICT benefits (i.e. outcomes) are gleaned from stories regarding changes in users' situations, behaviours, attitudes, or from evidence of new aspirations. Gigler (2011) has quoted other authors stating that other benefits are intangible and thus are difficult to measure. Also benefits of investing in ICTs are experienced in different ways in communities in which ICT projects are deployed and benefits may be recognized after a period of time. Other benefits of accessing and using ICTs include improved social relations (improving ones self-esteem, expressions of aspirations, and civic engagement) (Gomez, 2013), and entertainment, communication, and risk reduction (Bannister and Remenyi, 2003).

Back to capability approach, Hatakka and De (2011) considered choice as one of its fundamental aspects and that ICT may increase the number of options from which to choose. Availability of options seems to be affected by the environment of the individuals and communities. As early mentioned, lack of electrical power and roads may limit options (i.e. choices) of rural smallholder farmers when accessing markets and market information for their produce. To make meaningful choices, first Alsop and Heinsohn (2005) emphasized the notion of envisaging options. In their ICT4D Evaluation Model, Kivunike *et al.* (2014) included choice as one of the achieved functionings.

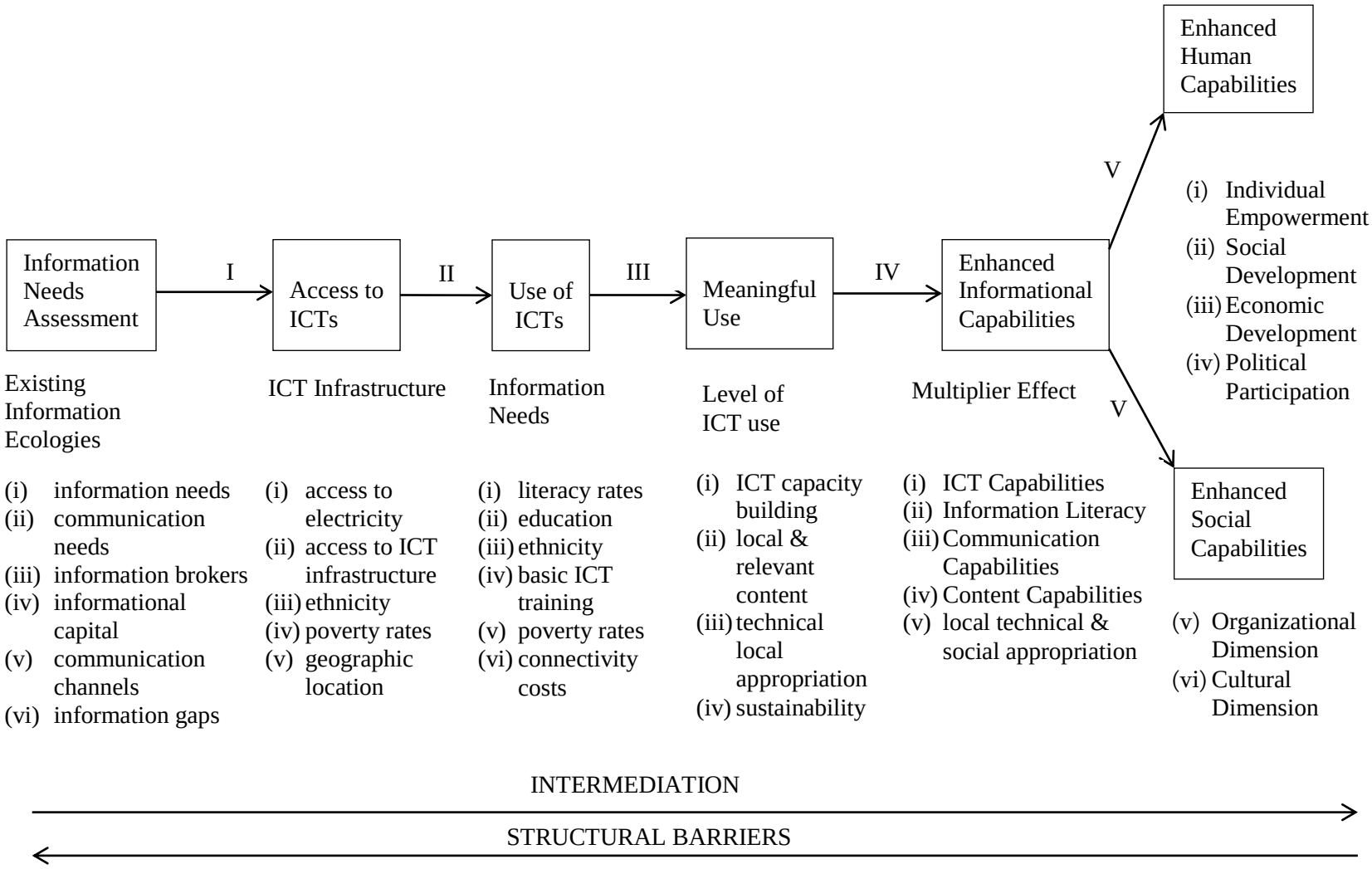


Figure 15: A 5-step process - ICT impact chain

Source: Gigler (2011)

Though the frameworks revisited are centred on empowering individuals by developing and enhancing their capabilities, sustainability in the last three frameworks above is not explicitly stated. The interest of an ICT intervention program is to develop an ICT project which is either operationally sustainable or fully viable and which has development impact. Development impacts can include improvement in the welfare and living conditions of a large number of low-income people, and benefits in very poor segments of the population. The key question to the ICT initiatives is the long-term sustainability. Drivers and barriers to optimal usage of ICTs in achieving specific development impacts have effects to sustainability of ICT intervention programs. While advocating the role of ICTs in poverty alleviation in developing countries, an approach that eliminate pre-existing conditions hampering the adoption of technologies is essential (Chib and Zhao, 2009). Further, Chib and Zhao (2009) explained sustainability in terms of the removal of undesirable conditions, and the resultant characteristics of individuals living in those conditions, that hamper marginalized communities from benefiting from ICT usage in specific areas. This study, through section 5.2.9 will give details of how sustainability can be ensured in the developed framework.

Though some ICT4D researches have considered aspiration as among the non-material benefits, the frameworks so far revisited have not explored it. In their alternative approach of measuring the non-material impacts of ICT4D, Gomez *et al*. (2013) included the expression of aspirations in operationalizing the Community Wellness Outcomes (i.e. a set of outcomes that represent increased individual freedoms). Ray and Kuriyan (2010) considered development as progress or improvements of the poor and noted that such improvements are inextricably linked to aspirations. In a qualitative study of learning centres in rural India on technology hopes of parents for their children, Pal *et al.* (2007) identified aspirations as an important positive result of ICT deployment (i.e. outcomes). Also, Gomez *et al*. (2013) suggested that ICT can provided values in helping individuals to actualize their aspirations and also to develop positive aspirations in their undertakings. Thus, aspirations are thus a stronger basis on which to build sustained effort and action to progress and improvements (Toyama, 2017a). This study considers aspirations among the important aspects of ICT interventions when implementing ICT projects for developing the capabilities of the poor in the development process. As such, section 5.2.7 (i) has detailed on the concept of aspirations in ICTs.

5.2.4. Developing a Framework for Accessing Agricultural Market Information

The purpose of this section is to examine the findings of the research in relation to the research objective of developing a framework for accessing agricultural markets and market information by rural farmers for their farm produce. The section discusses the findings presented in Chapter Four and compares them to the literature. Insights from the survey, readings and observations have assisted in providing a robust view on issues related to the subject under consideration. The section forms a narrative of the entire dissertation incorporating ideas that have emerged over the course of the research and, whenever possible, the results are compared with previous findings. The research findings for each of the objectives are discussed/summarised and explained within the context of current academic knowledge and the section concludes with a proposed framework that can link rural farmers to agricultural markets using ICTs.

The framework is based on the capability approach and on the Empowerment Framework by Alsop and Heinsohn (2005). The framework also takes some elements from the SLF. The proposed framework will use as a resource, the structure-agency components, of the Empowerment Framework and link it to the empowerment component while taking the elements or 'capitals' of the livelihood assets of the SLF. Using the capability approach, issues, challenges and concepts will be mapped to different sections of the proposed framework.

(i) Access to and Use of Agricultural Market Information

Back to section 4.8, poor access to agricultural market information is attributed to illiteracy, lack of skills and knowledge, unavailability of information and poor/no means of information collection and dissemination. This calls an individual to be information capable where s/he can find, locate, interpret, act on and disseminate information. To be information capable, one needs to be literate, skilful and knowledgeable on information collection and dissemination. Means of information collection and dissemination i.e. 'technology' can facilitate such processes. Literacy, skills and knowledge constitute education capability of an individual. Based on the SLF, Empowerment Framework and the Capability Approach, information capability can enable an individual with education capability to use technology in accessing agricultural market information. In Sustainable Livelihood Framework, Information and education are considered as assets or 'capability' of an individual while technology contributes an opportunity structure in the Empowerment Framework.

To get a good insight of the information capability, one can consider the concept of information literacy which is based on library and information sciences. The early study by Zurkowski (1974) pointed out that information literacy is the ability of an individuals to find, evaluate, and utilize various sources of information, which included the following five capabilities: (a) knowing what kind of information is helpful; (b) knowing where to get that information; (c) knowing how to inspect the information; (d) evaluating and organizing the information; and (e) immediately transmitting the information. Among the many definitions of information literacy, American Library Association and Association for College and Research Libraries (2000) defined it as a set of abilities requiring individuals to "recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information. Based on Zurkowski's (1974) description and a definition by American Library Association and Association for College and Research Libraries (2000), information literacy includes (a) capabilities of reading and writing; (b) capability to use media i.e. technology to solve information problems; (c) capability to interpret and use information; and (d) capability to network with others i.e. transmit information to others i.e. socialization.

Based on a study by McClure (1994), Gigler (2011) defined four components of information capability as ICT capability, information literacy, communication capability and content capability. Kennewell *et al.* (2002) defined ICT Capability as the ability to use ICT to carry out worthwhile activity, including the learning of subjects other than ICT. Communication capability means to effectively communicate with others while content capability means to produce and share local content with others through the network (Gigler, 2011). Based on the capability approach, this study defines Information Capability as:

> the capability of an individual to transform existing information resources into human agency and opportunities in order to achieve the things he/she values doing or being.

Education resource represents education, skills and knowledge an individual acquires through formal and informal means. Education is very important in accessing and utilizing information as most information may be available in text format thus requiring an individual to have reading and writing capabilities. Use of technologies like ICTs also requires reading and writing capabilities.

(ii) Access to Markets

As was revealed in section 4.8, rural farmers have poor access to markets due to long travel

distance, poor road conditions, lack of transport, small volume of produce to sell, market location, and financial constrain. Poor access to markets has introduced middlemen who have links with both farmers and traders and thus get shares when sales deals are done. Though middlemen are important, they exploit farmers by taking a large share of their (i.e. farmers) benefit accrued from the sales of produce. Thus, rural areas need to be connected by roads that are passable throughout the year and also have means of transporting produce to markets. It is the responsibility of the government to ensure roads are constructed and markets are developed. The government may also establish means of transport like constructing railways and airports. However, farmers may also own means of transportation like bicycles, motorcycles, cars, and trucks. Ownership of transporting means requires rural farmers to be financially stable, the same as to government to construct roads, airports and railways. Thus, ownership of transporting means and finances are important for rural farmers in reaching and accessing markets, and are regarded as assets or capitals in SLF. Based on the Empowerment Framework, transporting means constitute Material Asset. With respect to SLF, means of transport, ICT tools like computers, mobile phones et cetera are termed Material Resources. Material resources can be expanded to include agricultural production resources and anything that facilitate production, and processing of agricultural produce. Material resources facilitate and strengthen the capability of an individual farmer and can be defined as:

> material objects owned by an individual farmer which facilitate the production, processing and transportation of agricultural produce to markets for sell.

Financial capital denotes the financial resources a farmer uses in his/her agricultural dealings. The financial resource can be in form of cash, savings, and shares. Based on Empowerment Framework, the government forms the structure and constitutes the 'institution'. The institutions, both public and private, set and implement policy and legislation, deliver services, purchase, trade and perform all manner of other functions that affect agricultural activities (DFID, 1999).

Geographical location of the market also has an implication on the means of transport, volume of produce to transport, time and finances to the farmer. Means of transport and transportation costs (i.e. finances) are required by farmers to transport produce to distant markets. Psychosocially, a small-scale farmer finds it difficult to transport large volumes of produce to distant markets due to financial constraints. Thus, geographical position and

location of the market can be regarded as a resource (geographical capital) which consumes other resources (i.e. time and finances). A study by Boekestein (2006) emphasized the importance of location and region in describing geographical capital and considered strategic location as intangible asset. Azzoni *et al*. (2000) used geographical characteristics such as climate, public and private infrastructure (which affects growth rates of states or regions by influencing productivity of individual or family) to describe geographical capital. Another study by Helbrecht (2004) used the attributes of a place, its 'look and feel' to describe the geographical capital in knowledge-based economy.

Other factors that affect access to markets by farmers are weather and climatic conditions. Most rural roads are poor and muddy during the rainy season, thus difficult to be passed. It is difficult to access main roads connecting regions and cities during the rainy season and this discourage farmers to transport produce to distant markets. In SLF, weather and climate constitute natural resources.

Though farmers claim that they are market participants, a thorough analysis indicates that they participate partially in marketing activities. As narrated, distant markets, transports and storage facilities are some of the barriers to market access. Other factors such as age may be a barrier to market access (i.e. elders may find it difficult to travel to markets compared with youths). Also, a factor such as difficulties in communication (i.e. due to language barriers) may limit interaction and socialization of farmers at markets. These barriers to markets and worries constitute to a psychological resource and attribute the farmers' perceived exclusion to markers access.

Access to markets can also be explained in terms of genders. In a family, men are the heads and in most cases decide/determine/influence activities that are undertaken by family members. Thus, men may dictate access to markets by others, especially women. This is in the cultures of many tribes in developing countries including Tanzania. As revealed in 4.6.2, women were few compared to men and thus men may participate more in agricultural marketing than women. Thus, culture contributes an important resource to be looked on when linking farmers to markets.

(iii) Networks of Farmers

Social networks affect the lives of rural farmers as sharing information, knowledge, and experience do influence the life of an individual. If something happens within the social

network, members are likely to know about it. A small social network, not extended to many individual farmers, is exposed to less information, especially for small scale farmers living in rural areas with limited access to information sources. Traditionally, men in local communities are more exposed to social networks than women who are frequently outside such social networks. Social networks are very beneficial to small scale farmers for a number of reasons. Farmers within social networks can share information about market variables like produce prices at different markets, scarcity of produce, quality and standard of produce, and availability of traders. Farmers within a network can also decide to sell their produce collectively at a common agreed price or can decide at which market to send their produce to for sale. Farmers' networks facilitate collective actions such as selling of produce and regulate relationships within the group thereby enhancing smallholder farmers' participation in agricultural markets.

Within farmers' networks, we can differentiate between 'informal' and formal 'networks'. Informal Networks can be described based on a modified definition by Onumah *et al.* (2007) as informal groups, which often have an inward-oriented function to facilitate collective selling of produce, and also regulate relationships within the group. The Formal Networks are referred to as Producer Organizations (POs). Bee (2004) described producer organization as institutional arrangements that regulate individual and collective actions by rural producers in order to safeguard and promote their economic, social, and political interests. Bee (2004) has identified service providing organizations such as cooperatives and associations as producer organizations. In Tanzania, farmers growing cash crops (e.g. cashew nuts, tobacco, coffee, cotton etc.) are members of farmers' organizations commonly known as cooperatives (e.g. Kilimanjaro Native Co-operative Union (KNCU), Kagera Cooperative Union (KCU), Nyanza Cooperative Union (NCU), and Morogoro Regional Cooperative Union (MORECU)).

Cooperatives are very important to economies of the members and the nation at large. Sizya (2001) noted that the effects of the cooperatives largely: enabled the farmers to receive higher prices, provided a means of channelling power and influence on the larger farmers, and offers a way of involving farmers in cash crop production, creating an avenue for upward mobility and political advancement. Also, cooperatives provide employments, boost income, and reduce poverty, provide social protection to each member through mutual support, and give voice to members (Maghimbi, 2010). Shiferaw *et al.* (2006) argued that producer organizations, like cooperatives, play a critical role in both the delivery and coordination of

marketing services to smallholder producers and facilitate collective marketing of agricultural outputs, thereby reducing transaction costs. Collective marketing enhances small-scale farmers' ability to negotiate for better prices, and improve their market power, facilitate access to better markets, reduce marketing costs, and synchronize buying and selling practices to seasonal price conditions (Shiferaw *et al.*, 2006). Producer organizations can shorten the marketing chains by linking producers more directly to the upper end of the marketing chain (Shiferaw *et al.*, 2006).

Thus, social networks require an individual small-scale farmer to develop social capital to initiate or join network of farmers. Social capital originates with people forming social connections and networks based on principles of trust, mutual reciprocity and norms of action. Social capital is the raw material of civil society (Evans, 1996). It is created from the myriad of everyday interactions between people. It is not located within the individual person or within the social structure, but in the space between people (Evans, 1996; Portes, 1998). It is not the property of the organization, the market or the state, though all can engage in its production (Portes, 1998). People engage with others through a variety of lateral associations which are both voluntarily and equally. Social capital cannot be generated by individuals acting on their own. It depends on a propensity for sociability, a capacity to form new associations and networks (Skidmore, 2001).

There is no set and commonly agreed upon definition of social capital for substantive and ideological reasons. A particular definition adopted by a study will depend on the discipline and level of investigation. This study adopts a definition by Portes (1998) who defined 'social capital' as:

> the ability of actors to secure benefits by virtue of membership in social networks or other social structures.

Thus, to possess *social* capital, a person must be related to others, and it is those others, not himself/herself, who are the actual source of his or her advantage. Social capital is developed through networks and connectedness, membership of more formalised groups, and relationships of trust, reciprocity and exchanges (DFID, 1999). As it lowers the costs of working together, social capital facilitates co-operation (Coleman, 1988).

The social networks, associations, cooperatives and the like that are formed by farmers collectively form a structure 'organizations'. An organization is usually formed by a group of

people who come together for a common goal and get unified under a common identity. Members of an organization usually set rules for guiding themselves in order to reach the organization's purpose. This study clearly distinguishes between institutions and organizations. Institutions are the rules of the game in a society or, more formally, are the humanly devised constraints that shape human interaction while organizations are groups of individuals who work toward a common goal or objective and have common interests (North, 1990). Thus, institutions guide human behaviour while organizations are formed to achieve special goals and purposes.

In summary, nine (9) resources have been identified as important in linking rural farmers to markets. These resources are informational, educational, financial, material, geographical, natural, psychological, social and cultural. Some of the structures that aid or constrain the use of resources were also identified. Three structures (Technology, Institution and Organization) are discussed and the next section will attempt to work more on the structure.

5.2.5. Structure

The structure forms a context (an environment) within which the agricultural marketing activities are conducted. As of Alsop and Heinsohn (2005), the structure is shaped by presence and operation of formal and informal institutions (i.e. rules of the game), and includes the laws, regulatory frameworks, and norms governing people's behaviour. Both the Empowerment framework and the SLF take into account the structure which aid or constrain the agencies. Alsop and Heinsohn (2005) listed formal and informal laws, regulations, norms, and customs as structural elements of Empowerment Framework. Department for International Development (1999) listed organizations, laws, policies, culture and institutions as elements of SLF structure.

In the previous section, this study has identified Technology, Institutions and Organizations as structures that can aid or constrain agricultural marketing activities by small-scale farmers. Essentially, technologies, specifically ICTs, facilitate broadcasting and sharing of marketing information of agricultural products which can be used by market participants. Based on Sen's approach, technology is considered as building capability of farmers in agricultural marketing. A farmer equipped with marketing information can bargain and negotiate for better price of agricultural products. Use of technology, like mobile phones, means an individual will shorten time and distance of searching for information, though its ownership

and use require investment in financial resources. Gerster and Zimmermann (2003) attributed technology (specifically ICTs) with four characteristics: interactivity, permanent availability, global reach, and reduced costs for many. This study adopts technological determinants by Gerster and Zimmermann (2003) on access and use of information using ICTs which are connection availability, affordability and capability (i.e. skills required to operate an ICT device).

The definition of an Institution in section 5.2.4 (iii) denotes its three (3) important features which are apparent: they are humanly devised, they are the rules of the game setting constraints on human behaviour, and their major effect will be through incentives. Institutions are embedded in and develop out of the culture of communities or larger societies (DFID, 1999). Institutions as a key determinant of incentives, should have a major effect on economic outcomes, including economic development, growth, inequality, and poverty (Acemoglu and Robinson, 2010). These institutions may be public or private. In Tanzania, public institutions consist of the responsible Government Ministries (Ministry of Industry, Trade and Investment, and the Agricultural Sector Lead Ministries), Departments, Units and Agencies that are involved in agricultural marketing systems in one way or another. The public institutions are responsible for setting and enforcing agricultural marketing rules, laws, customs and policies. Also, the public institutions are required to invest in activities that simulate and facilitate agricultural marketing like rural infrastructure, transportation and communications. Regulatory and public support functions are carried out by the Government's institutions. Private institutions (or sectors) may invest in agricultural production, processing and marketing functions. Also, public institutions oversee the development of the private sector by creating conducive environment for participation in agricultural production and marketing.

With the intent of safeguarding small scale farmers in agricultural marketing, different organizations, both formal and informal, have been established. According to Sizya (2001), the effects of formal organizations, commonly known as 'Cooperatives' or 'Farmers' Organizations', are (a) to enable farmers to receive higher prices, (b) to provide a means of channelling power and influence by small scale farmers to larger farmers, and (c) to offer a way of involving farmers in cash crop production, creating an avenue for upward mobility and political advancement. Onumah *et al.* (2007) used the term 'Producer Organizations' and adopted the IFAP's definition of Producer Organizations to include cooperatives, producer

Table 14: Identified framework components – Agency and Structure

Description	Resource/Asset /Structure	Framework
To be literate, skilful and knowledgeable on information collection and dissemination	Education	--
Ability to find, locate, interpret, act on and disseminate information	Information	EF – Asset
Ownership of transporting means, ICT tools like computers, mobile phones etc., agricultural production resources and anything that facilitate production, and processing of agricultural produce	Material	EF – Asset
	Finance	SLF – Capital, EF – Asset
Time and finances affected by position and location of the market	Geographical	--
Weather and climate (i.e. natural factors) affecting agricultural marketing i.e. limit access to markets	Natural	SLF – Capital
Perceived exclusion to markers access due to different barriers to markets	Psychological	EF – Asset
Perceived exclusion in markets due to culture	Culture	--
To secure benefits by virtue of membership in social networks or other social structures	Social	SLF – Capital, EF – Asset
Providing regulatory and support functions: – set and implement policy and legislation, deliver services, purchase, trade and perform all manner of other functions that affect agricultural activities – invest in agricultural production, processing and marketing functions	Institution	EF - Structure
Means of information collection and dissemination. Access determined by connectivity availability, affordability and capability (i.e. skills required to operate an ICT device)	Technology	EF - Structure
Social networks, associations, cooperatives etc. that are formed by farmers collectively	Organizations	EF – Asset
Regulatory mechanisms	Formal Informal	--

Key: EF – Empowerment Framework, SLF – Sustainable Livelihood Framework

associations, chambers of agriculture and other forms of non-economic associative bodies. Stockbridge *et al.* (2003) noted that producer organizations offered a means of reducing constrains of accessing market by rural farmers and thereby enhancing smallholder farmers participation in agricultural markets. With this, different farmers' groups and associations were established. An example is a National Network of Smallholder Farmers Group in Tanzania (MVIWATA). Established in 1993, MVIWATA, a national farmers' organization, brings together smallholder farmers from all regions of Tanzania in order to have a common

voice to defend the farmers' economic, social, cultural and political interests (Okore, 2014). With these organizations, farmers are registered to be members, and their leaders are elected based on their constitutions.

Presence of institutions, organizations and technology in the marketing sector signals the presence of regulatory mechanisms. Thus rules, laws, norms and policies are set to guide and regulate the marketing functions by participants within the agricultural sector. The presence and operation of these rules, laws, norms and policies determine and regulate how an individual farmer, organization or any other market participant can behave and act.

In summary, the agricultural marketing environment can be shaped by utilizing technology, having institutions that control and facilitate marketing functions, Organization that protect producers, and laws, rules, norms and policies that guide and regulate marketing activities. A small-scale farmer equipped with technology can access agricultural market information to make important selling decision. Under the presence, guidance and operation of the laws, rules, norms and policies, the regulating institutions can control the marketing functions to ensure businesses are fairly conducted. Farmers' organizations work better to ensure a large share of benefits is accrued to farmers. Also, technology can help farmers to access different markets for his/her produce, thus introducing a concept of choice and preference. Based on Alsop and Heinsohn (2005) approach, a small-scale farmer is said to be empowered by technology to access different markets. Table 14 summarizes the identified components (agency and structures) and the framework from which they were adopted. The following section will attempt to work on how technology can be utilized to ensure farmers are empowered to access different markets.

5.2.6. Links with Markets

Linking farmers to markets with technology is analogous to 'degree of empowerment' component of the Empowerment Framework by Alsop and Heinsohn (2005). First, technology should offer different possibilities for accessing agricultural market information (Existence of Access Methods). Existing access methods may be through mobile phones, computers, radio and TV broadcasts, and magazines. Second, existing access methods should be relevant to an individual farmer (Relevance of Access Methods). Method to access agricultural market information becomes relevant when it is available to a technology device used by a respective farmer. Third, is concerned with whether a farmer actually uses the

existing relevant access method (Use of Access Methods) to access agricultural market information. Forth, is concerned with whether use of existing relevant access method by a farmer to access agricultural market information resulted into the desired result (Achievement of Access Methods).

For several reasons, including financial and technology, means to access agricultural market information may not exist or be not available to farmers. Lack of financial resource may constrain farmers to purchase or operate a device for accessing agricultural market information. Sometimes, technology may not be available within the vicinity of a farmer or farmers themselves may lack skills (capability) to operate such a device.

Technology becomes relevant and sensible to an individual farmer when it is available and such a farmer has skills (capability) to operate it. Lack of education resource and thus skills to operate a technology makes such a technology irrelevant to an individual farmer. The second item 'Relevance of Technology' has been added as a result of observation during the field visit. Despite owning technology devices (e.g. mobile phones), it was observed that some farmers were not conversant with some functionalities provided by mobile phones. Most farmers were conversant with the calling and receiving calls functions of the mobile phones, and some did not know how to compose text messages. Mobile phones owned by most farmers were basic phones which do not provide services such as Internet access (i.e. searching information, sending and receiving emails), online chart, Voice over Internet, radio services etc.

Use of access method involves measuring whether or not famers take opportunity of accessing agricultural market information using the available means of technology. Individual farmer's financial asset may determine the use of technology in accessing agricultural market information. Also, literacy (i.e. skills and knowledge) in operating a specific technology may determine the use of access method by an individual. The achievement is measured by how far an individual farmer is able to send his/her produce to markets based on the agricultural market information he/she accessed via a technology device. But what actually is the achievement of this process? The next section will discuss the various outcomes of the process of providing farmers with access to agricultural market information and thus linking them to markets.

5.2.7. Development Outcomes

Outcome form the achievement or output of the process of linking smallholder farmers to markets. The Empowerment Framework has called this 'Development Outcomes' while the SLF has called it 'Livelihood Outcomes'. Alsop and Heinsohn (2005) has associated the whole process of empowerment to development outcomes. Department for International Development (1999) insisted that livelihood outcomes are important as they help to understand what motivates people to behave the way they are, and what are their priorities. Sen (1999) considered expansion of freedom as enhancing individual's capability to live the life he/she values. Individuals can enhance their capabilities in technology, education, knowledge, and communication. With this respect, ICTs appear to be a useful tool in transforming services and functions into achievements.

But what is the outcome or achievement to an individual small-scale farmer with respect to this study? Possibly, farmers may express their desires and wants, aiming for something higher. Some of the desires may include statement like 'I want to be a big farmer growing and supplying food crops to large markets', 'I want to be successful in agricultural production', 'I want to increase my income through agricultural production' etc. These statements denote and express the aspirations of small-scale farmers on agricultural production. Their aims are successes (e.g. greater income, quality production, successful businesses etc.). Thus, aspirations need to be taken into consideration when modelling the output of the development process. The next section details the aspirations of small-scale farmers in agricultural marketing when ICT intervention is introduced.

(i) Aspirations of Small-scale Framers in Agricultural Marketing

As a construct, aspirations occur in several contexts in human life including in agricultural marketing. Through discussions and talks, small-scale farmers may express their desires on agricultural activities, including agricultural marketing. In psychological field, aspiration is discussed as desire for a level of achievement with respect to a certain task (Toyama, 2017b). Among the earliest mention of aspiration in the sense of psychology was provided by Leon Festinger, when he was a master's student who said in playing a game or taking a test, the question might be "What score would you like to get next time?" (Festinger, 1942). In the most widely cited article, Appadurai (2004) coined the phrase "capacity to aspire" to indicate community-based navigational ability that connects long-term desires with short-term capacities and suggested the focus for development be to raise poorer communities' capacity

to aspire. Appadurai (2004) generalized that aspirations are about the good life, about health and happiness, and exist in all societies.

The construct of aspirations has been defined differently. Appadurai (2004) associated aspirations to wants, preferences, choices, and calculations. In Dictionary.com, aspiration is defined as "a strong desire, longing, or aim; ambition" (Dictionary.com, 2016). In the Oxford English Dictionary, an aspiration is "steadfast desire or longing for something above one" (Oxford English Dictionary, 2016). Thus, aspiration can be defined as a strong desire to achieve an end; an ambition. Based on these definitions, Toyama (2017b) identified three elements which make up aspiration: (a) aspirations are a kind of desire; (b) aspirations are persistent; and (c) aspirations aim for something higher. Aspirations reflect the propensity of individuals to hold in mind certain future accomplishments, and the level of those accomplishments (Gomez *et al.*, 2013). Based on these descriptions, aspirations can be said to contain two distinctive aspects. Firstly, they are future oriented in the sense that they can only be actualized in the future (Sherwood Jr, 1989). Secondly, aspirations are motivators in a sense that individuals are willing to invest time, effort or finances to attain them (Sherwood Jr, 1989). Toyama (2017b) added that aspirations have motive force for development.

Aspirations are stronger basis on which to build sustained effort and action as are long-term, actualized in the future. Thus, aspirations require and encourage the development of abilities by an individual and shift attitudes. For example, to be information capable, one needs to develop/improve both his informational capabilities and literacy skills. Also, an individual attends schools for years to develop his/her educational capability to attain high academic profiles. Likewise, a small-scale farmer needs to develop his/her informational ability to be successful in agricultural marketing. Some resources are consumed in developing the abilities and attitudes of an individual. The abilities and attitudes which an individual develops are propagated to future generations. Focusing on aspirations, Toyama (2017a) quoted a very popular saying "Give a man a fish, he eats for a day; teach a man to fish, he eats for a lifetime" and added that teaching fishing is equivalent to mentoring people toward their own aspirations.

The ability to recognise and pursue pathways to achieve goals (i.e. navigational capacity) among the individuals in a society do vary (Gale *et al.*, 2013). This navigational capacity relies on resources (i.e. social, economic and cultural), knowledge and previous experiences of successful navigation (Appadurai, 2004) and circumstances can enhance or diminish the

capacity to navigate from where we are to where we would like to be (Prodonovich *et al.*, 2014). For aspirations to be actualized, an understanding of how to navigate the "dense combination of nodes and pathways" that lie between the present and an imagined future is required (Appadurai, 2004; Prodonovich *et al.*, 2014). More privileged and advantaged groups have more resources at their disposal to explore the future more frequently and more realistically (Appadurai, 2004). Those with less opportunity to develop their capacity to aspire (e.g. the marginalised and disadvantaged rural farmers) have "a more brittle horizon of aspirations" (Appadurai, 2004). Lack of opportunities to practice the navigational capacity and fewer navigational experiments both heighten the horizon of aspirations for the poor (Appadurai, 2004).

Small-scale farmers from disadvantaged rural areas are similarly less able to realise their aspirations for the future in agricultural marketing. They may well aspire to be successful in agricultural marketing of their farm produce but the limited socio-technological, economic and material resources available to them diminish their capacity to attain that aspiration. For example, lack of information and finances, and illiteracy can lessen their capacity to navigate their ways to successfulness in agricultural marketing and in agriculture in general. The often agricultural market information shared among sellers, consumers, traders, and middlemen are less readily available to small-scale farmers from disadvantaged rural areas. Thus, if no alternative to enable small-scale farmers to access markets and market information for their farm produce, it means that small-scale farmers from certain disadvantaged rural areas are less capable of realising their aspirations in agricultural marketing and in agriculture in general.

Thus, it is essential to take into consideration the aspirations of small-scale farmers while looking for an ICT intervention program that can improve their livelihoods. As earlier mentioned, the ultimate of the intervention program is success in terms of improvements and progress. It is these improvements and progress we call developments, and they are achieved when the aspirations of individuals are actualized. Thus, this study calls aspiration among the outputs of ICT intervention program.

During the data collection, the question was asked open-ended, toward the end of the survey to learn the desire of small-scale farmers in agricultural marketing. Responses were recorded and later coded. Some of the responses with the tone of aspirations are listed below:

- "I want to be successful in agricultural marketing, supplying farm produce to bigger markets in Tanzania and East Africa". Male, 32 years, growing maize, with about 5 acres of land.
- "If others have managed to be successful, why not us (i.e. farmers in the survey area)?" Male, 29 years, growing maize and bananas, with about 10 acres of land.
- "To be successful in agricultural marketing and cultivate both cash and food crops and sell to town markets". Female, 37 years, growing maize, bananas and coffee, with about 7 acres of land.
- "Through agriculture, I want to educate my children to university level". Female, 34 years, growing maize, with about 4 acres of land.
- "To be successful and adopt modern agricultural practices". Male, 40 years, growing maize, bananas and coffee, with about 15 acres of land.
- "To be a successful farmer from whom others can learn". Male, 44 years, growing maize, with about 21 acres of land.

(ii) ICT and Aspirations

Not much scholars have explored how the concept of ICT is related to aspirations, though ICT projects are frequently associated with newly expressed aspirations. Expressions and comments such as "Computers have completely changed the way we do our businesses or works", "Computers are key to successes", "Use of ICT in tax collection has tremendously boosted the revenue in Tanzania", "Computers have changed the lives of many" etc. are frequently reported, especially during this era where ICTs uses are being adopted and mainstreamed in services delivery. These expressions capture technologies (ICTs) as real 'actors' (Marx, 1997) and in part reflect the hope, mystique and symbolism that are generated by users (Keniston and Kumar, 2004). Ray and Kuriyan (2010) suggested that these new aspirations are a positive development for which ICTs can take some credits.

Though the role of aspirations is often not explicit in broader development literature, some ICT studies have documented evidence of altered aspirations in their works. In these works, ICTs are frequently reported to raise both the social and economic status of individuals in the society. Ray and Kuriyan (2010) called this the 'notion of upward mobility' which are both material and symbolic in their content, and reflects both the potential for economic gains and for the identification with status and modernity that ICTs seem to promise. Some of expressed aspirations captured in ICT4D case studies are summarized below:

- Burrell and Anderson (2008) showed that aspirations of imagining and pursuing possible futures (such as to be wealthy, or to create businesses) were important factors that motivated Ghanaians immigrants in London. ICTs (e.g. the Internet, mobile phones) provided a space for Ghanaians to imagine possible futures and indulge fantasies of the destinations after their emigration. Also, ICTs provided ways for Ghanaians to broaden their knowledge and social horizons by making contact with other Ghanaians, strangers and foreigners in many countries (Burrell and Anderson, 2008).

- Kuriyan and Kitner (2009) studied the extent to which tele-center projects in India and Chile were benefiting poor women to bridge the gender digital divide. Through the ICT training program provided, the author indicated that women were constructing their personal identities and aspiring to be middle class or trying to maintain their middle class status. Also, though the program was implemented for the poor women, it was semi-middle class women who dominated such educational program. Women were participating in such program with hopes of assisting their husbands in their businesses and works and also to supplement household income and status. Also, the authors indicated that participating women in the program could not better understand the benefits of the training program.

- Pal *et al.* (2007) found that aspirations was an important positive outcome of ICT educational program (computer-aided learning) developed for some schools in four districts in rural India. Despite not understanding what a computer enables or the computer's functionalities, parents expressed the value of computer course and felt that the course became a symbol of future aspirations of jobs for their children. Also, parents regarded computers as means to social ascendancy and attributed a range of powers to them. From their thought that computers will bring access to jobs for their children, parent feared that agriculture was losing prestige and value.

Analysis of these findings suggest that ICT can provide value not just in helping individuals to realize aspirations, but in helping to develop positive aspirations in their own right (Gomez *et al.*, 2013). Ray and Kuriyan (2010) see that aspirations generated by ICTs are highly varied and are culture-specific. Cases in 1-3 above show that ICTs are linked to material aspirations such as incomes, jobs and higher education, and symbolic value such as social status, power and personal identity. Also, the case studies have indicated that the pathways for and individual to actualize his/her aspiration is not clear.

(iii) Output of the Framework

But how do we measure achievement? The capability approach by Sen does not prescribe a list of functionings that should be taken into account when evaluating outcomes. Sen wanted to advance the capability approach as a general approach and stressed the role of agency, the process of choice and the freedom to reason in the selection of relevant capabilities. When the capability approach is used in development projects, it is people who will be affected, and thus should decide on what will count as valuable capabilities to their lives. Thus, many studies do not measure capability directly, as this study does. It is the outcome component that will measure the achieved functionings that results from an individual choice of a farmer as a proxy for the capability. When evaluating outcomes, there is a possibility of asking individual farmer on their capabilities i.e. the things they value being or doing.

Farmers lived to expect different achievements based on individual's choice. As from the previous section, small-scale farmers expect their aspirations to be actualized through the development program and thus, aspirations of individuals are considered outputs. Back to section 4.10, majorities of small-scale farmers favoured 'increased income' as a result of being successful in agricultural marketing as agriculture is the mainstay of their lives. Other expected achievements are more productivity, Quality Production, More Voice, improved networks and increased social relationship. These outcomes implicitly signal the desires of the small-scale farmers in agriculture and improvements sought by the development partners. The overall achievement of empowerment is the enhanced capabilities of small-scale farmers in agriculture marketing and generally improvements in agriculture.

5.2.8. The Framework

Fig. 16 presents the developed framework based on the components and items identified, described and discussed in the previous sections. The framework depicts important issues and sketches the way they are linked to each other. The framework draws attention that different components interact in the process of linking farmers to markets to have development outcomes. The framework is centred on people and different stakeholders can be involved in the process. The aim is to engage different stakeholders in empowering smallholder farmers in the agricultural marketing of their produce. The arrows in the figure denote a variety of different relationships which are not linear and imply no direct causality, rather influence.

The figure shows how agencies (i.e. resources to be possessed by smallholder farmers and

market related ones) and structure (i.e. environment in which the agricultural marketing activities are conducted) can work to empower smallholder farmers in agricultural marketing to achieve development outcomes. The framework does not suggest either structure or agency as its entry point, rather shows how components interact to achieve development outcomes. The figure depicts that both markets and famers have related agencies.

Using people-centred analysis, investigation can begin with simultaneous identification of people's assets (agency) and the structure which can facilitate links to market in order to achieve development outcomes. The framework also indicates that development outcomes provide important feedback to the structure and agency. The double-ended arrows depict mutual influence between agency and structure and signal that items in one component can affect items in another component and vice versa. Based on the capability approach, expanding people's freedom is also the means of development as it allows individuals to have options and choices. Thus, development outcomes depend on an individual's preferences based on the choices he/she makes and can be used to measure the achieved functionings. The development outcomes provide important feedback to both the structure and the agencies. Example, more income or 'increased income' can affect the technology used by an individual, at the same time influencing his/her financial, educational, and informational resources.

The nine (9) types of resources (i.e. resource portfolio) are used to map the agencies of an individual onto the framework. Some of the resources were covered in the two previous frameworks (i.e. Empowerment framework and the SLF) with exceptions of cultural and geographical resources. These resources are inter-linked and do have effects on others. For example, an educated individual is more likely to have access to more information. The same, an individual with financial resource can invest more in education as well as access information easily. Another example is an individual who is more sociable is likely to be in a good psychological mood. It is important to note that the agency interacts with structure when smallholder farmers are accessing markets for their produce.

Elements and factors listed in the structure may limit or reinforce interaction with individual's resources during the agricultural marketing activities. With the help of educational resources, an individual might easily use the available technology in accessing agricultural market information. Government institutions may work to ensure availability of rural roads for transporting produce to markets, technologies to facilitate information

communication, and rules, laws and policies are set and are in operation. Farmers' organizations may work to ensure agricultural market information is available to farmers using the available technologies. Thus, the double-ended arrows between the interface of structure and agency indicate that the influence may be bi-directional.

Based on the capability approach and perspective, one can ask whether the developed framework can lead to the expansion of capability of an individual small-scale farmer. The framework is intended to be a versatile tool for use in planning and managing the process of linking smallholder farmers to agricultural markets by providing them with market information. It offers a way of thinking about agricultural marketing and conceptualizes the many factors that affect it. An important remaining task is to put the framework into practice to make it a living tool. Thus, governments, development practitioners, and farmers' organizations can adapt the framework while implementing development programs in respect to agricultural marketing. Usually, development partners will aim to implement a win-win development program where both partners and farmers benefit. Care should be taken to ensure the less disadvantaged group (i.e. smallholder farmers) benefit more and are not exploited.

As a fact, issues do change with time and development. Similarly, elements of the framework are prone to changes with time and development. We are noticing how ICTs are changing rapidly and penetrating rural areas. With time, rules, laws and policies do change in the political and democratic processes. Also, in Tanzania, we are witnessing how the government is expanding the education infrastructures to ensure all its citizens attend schools. With time and development, we are witnessing how traditional and informal rules and laws are vanishing. Thus, it is important to understand and consider the capabilities of the affected people (i.e. smallholder farmers) while introducing the changes to the structure.

5.2.9. Issues of Sustainability

The success of ICT projects within the rural context relies on the ability of the project to be sustainable. Currently, ICT projects are being deployed in various sectors in developing countries to aid in services deliveries. The end may be to exist in the information society (Castells, 2001; Heeks, 2002b), or to integrate ICTs in service deliveries for effectiveness and efficiency. Supports for these ICT Projects initiatives in developing countries are many (Carmel, 2003; Kuriyan *et al.*, 2006), and their list is long, including use of ICTs in

educational institutions (Proenza, 2005), establishing rural community ICT kiosks and telecentres (Jauernig, 2003) and e-government applications (Gichoya, 2005). However, many of these initiatives face sustainability challenges (Madon, 2004; 2005), and their failure rate in developing countries is considerably higher than in developed countries (Heeks, 2002b).

A number of factors are attributed to the failures of ICT for development initiatives in developing countries. Heeks (2002b) and Korpela *et al.* (2000) attributed such failure to lack of appropriate skills and knowledge to identify and deal with the risks associated with ICTs on a long term basis i.e. lack of expertise and experience (Mueller-Jacobs and Tuckwell, 2012). Other failure factors include lack of executive management support and commitment due to poor understanding of project requirements (Ali and Bailur, 2007; Pade *et al.*, 2008), and poor management and leadership in managing time, finances, and communication (Nawi *et al.*, 2012; Pade *et al.*, 2008). Poor and week management leads to failure of measuring performance and making timely decisions in important issues regarding ICT projects (Avgerou, 2008). Gichoya (2005) and Standing *et al.* (2006) explained that failure factors of ICT projects are the results of lack of properly defined project scope or objectives, and lack of user support and involvement due to poor communication leading to lack of clarity about roles and responsibilities of individuals in the projects. Also, ICT projects failure is attributed by lack of focus on benefits realization (Kuriyan *et al.*, 2006; Mueller-Jacobs and Tuckwell, 2012).

Thus, sustainability of ICT projects needs to be considered while planning for such initiatives. This concept of Sustainability is extensively used in both development and ICT for development literature. Despite being explored much in literature, there is no common definition of sustainability. Ali and Bailur (2007) attributed sustainability to the condition of being sustainable and Reynolds and Stinson (1993) considered the word sustainability to mean support, maintenance, to keep something in perpetuation, to avoid failure, to keep alive or regenerate. In ICT context, Reynolds and Stinson (1993) explained sustainability as the ability to identify impacts and manage risks threatening the long-term viability of ICTs.

Sustainable development is also frequently mentioned in ICT for development discussions and Brundtland (1987) defined it as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs". This definition emphasizes the aspect of future orientation as a basic element of sustainability (Silvius *et al.*, 2009). The definition, also known as the “Brundtland definition”, combines

two ethical claims: intragenerational justice (meeting the needs of the present) and intergenerational justice (not compromising the ability of future generations to meet their own needs) (Hilty and Hercheui, 2010). With this, Ali and Bailur (2007) presented two (2) challenges to sustainability and sustainable development. The first challenge is a conceptual one which asks how to "keep in being" or ensure something "continues in a certain state" or how to ensure that we "keep a person a person or community, mind or spirit from failing or giving way". Ali and Bailur (2007) were referring to Fowler (2000) who argued that "no condition is permanent or controllable". The second challenge is that of operationalizing sustainability in sustainable development. To respond on the two challenges paused by Ali and Bailur (2007), sustainability needs to be considered from the start of the project by identifying critical success factors of a given ICT project. The planning phase can involve the identification of issues that are important, their actors and even running expenses. The next section explores more on sustainability for ICT projects, which are relevant even to AMIS initiatives.

(i) Sustainability in ICT for development

Initiatives to implement the AMIS to serve the rural farmers in accessing agricultural market information for their farm produce can emanate from farmers themselves through their associations or networks, from the government after receiving proposals from the agricultural actors, or even from development partners. Where donor funding are received to kick-start the project, care should be taken to ensure the project sustainability after the donor withdraw. The key issue is that the project becomes self-sufficient and sustainable i.e. it is crucial for a project to be able to generate income to cover its running expenses and also generate profit. To deal with the issue of sustainability of AMIS, this study adopts the five (5) categories of sustainability proposed by Pade *et al.* (2006) which are Social and Cultural, Institutional, Economic/Financial, Political, and Technological. However, a thorough analysis of Pade's *et al.* (2006) work reveals a close link between sustainability and financial sustainability, in that projects must be capable of cost recovery in order to be continuously operative and dynamic in the services they provide. To sustain the provision of agricultural market information to rural farmers through AMIS, these five categories *are explained* to get their insight.

Social and Cultural Sustainability

This comprises the social and cultural context in which the ICT project will operate, and its response to this context. Social sustainability is about minimizing social exclusion and

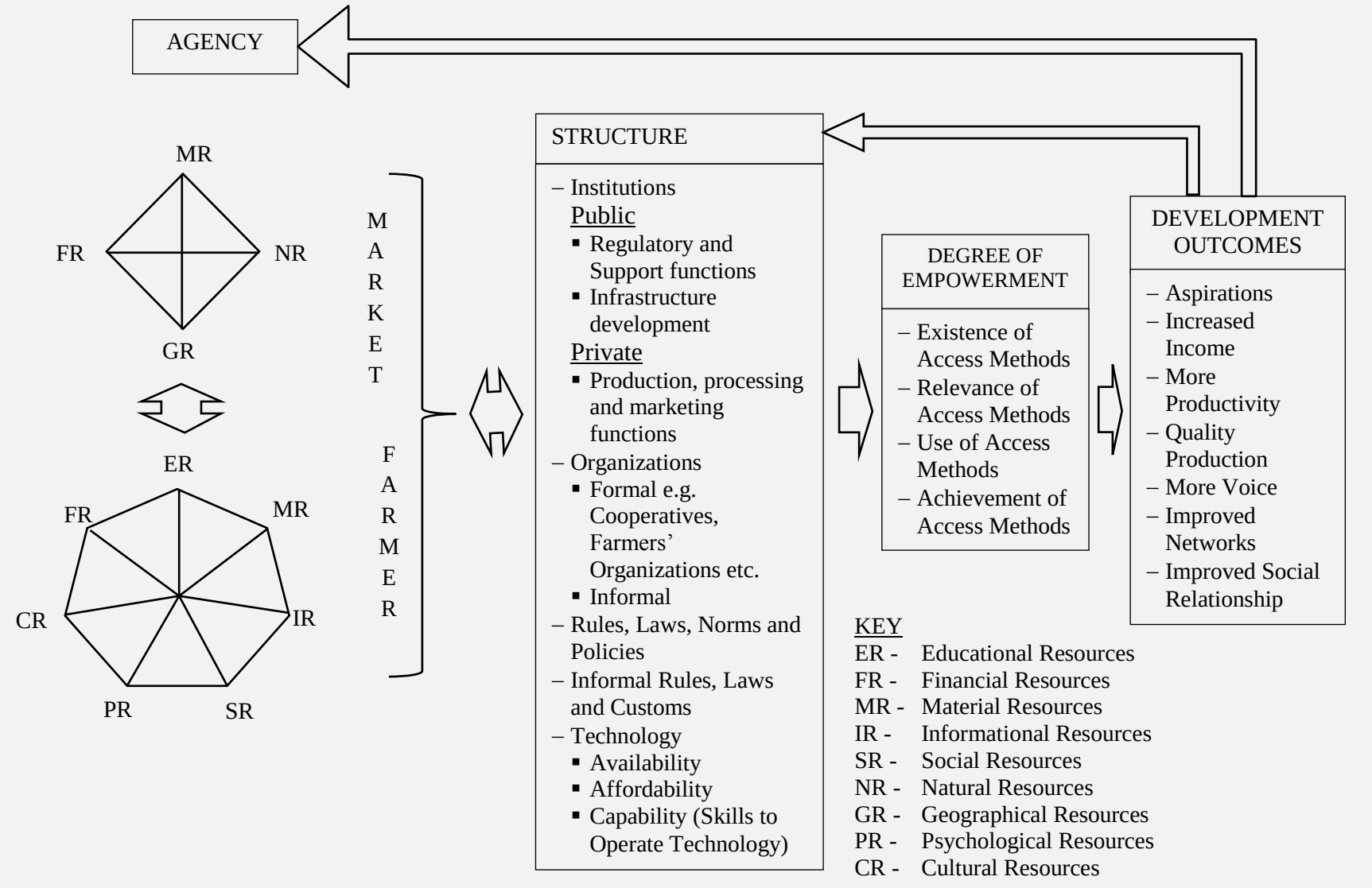


Figure 16: A Framework for linking smallholder farmers to markets

maximizing social equity in accessing agricultural markets and using agricultural market information. The aim is to ensure access to the markets and use of market information for heterogeneous groups of people in the community and responding to their different needs. This category becomes prominent when the project is sensitive to and aware of the local social and cultural context (Pade *et al.*, 2006), and people (i.e. smallholders) in the community feel themselves empowered by the project (i.e. AMIS), and become more active in seeking ways to keep it (i.e. project) running (Chasquinet *et al.*, 2002). This capacity requires individuals to have the freedom to choose how to improve their quality of life in the context of their own communities and social networks (Haghi and Zabihi, 2012). A group in a project may benefit more than others and thus build a tension which is not tenable, and thus leads to failure i.e. social unsustainability (Kumar and Best, 2006).

Institutional Sustainability

It is defined as the ability of the local institutions created or involved in the project, are managing project activities and processes effectively and efficiently in serving the services to the target clientele (i.e. smallholder farmers) during and post project period (Kisan *et al.*, 2013). These institutions strengthen the empowerment and participation of members in the project through capacity building, amongst project staff and partners, and empowering the institution to take control in local development issues (Talyarkhan, 2004). Aspects of institutional sustainability that need to be put in place include well-defined ICT laws, participatory policy-making processes, and effective public and private sector organisations that develop a framework in which the livelihoods of the community can be continuously improved (Nawi *et al.*, 2013b).

Economic or Financial Sustainability

This refers to the ability of an ICT project to generate income sufficient to meet both its operational and maintenance costs, in addition to reasonable surplus for other expenses such as emergencies (Proenza, 2001). It is among the greatest challenge for many ICT projects, initiated in the developing countries with donor funds, which stack after the donor withdraw (Harris *et al.*, 2003; Kumar and Best, 2006). These ICT projects (e.g. AMIS) may be problematic as they have conflicting objectives: generating sufficient income for their operations and maintenances, and ensuring equal access for those who cannot afford to pay for access (Kumar, 2005; Kuriyan *et al.*, 2006). Some ICT projects initiated with donor funding have shut down after the donor withdraw. Thus, there is a need to promote a spirit of

entrepreneurship to market ICT services rendered and to secure grant contributions.

Political Sustainability

An information and communication technology project is often confronted with political challenges that hinder its progress and sustainability (Nawi *et al.*, 2013a). Political sustainability is important for a project to be accepted by the main governing bodies of a community or country (Nawi *et al.*, 2013a). As the implementation of ICT for development projects is a highly political process (Kuriyan *et al.*, 2006), an ICT artefact needs to become institutionalized and accepted by the political actors (Avgerou and Walsham, 2000). Thus, a politically sustainable project means that local and national politicians and individuals can influence a project in a positive way (Harris *et al.*, 2003; Kumar and Best, 2006). Once the artefact is accepted as a social fact, it is maintained because of its legitimacy regardless of the evidence of its technical value (Avgerou and Walsham, 2000). Thus, gaining cooperation of politicians, policy makers, and governmental officials is necessary to create an environment or a regulatory framework that will protect, promote and support ICT projects and their activities (Chasquinet *et al.*, 2002).

Technological Sustainability

It is the ability for a technology to exist for a longer period of time without major shifts in hardware or software affecting its availability or durability (Misund and Høiberg, 2003). This ability includes operational simplicity, flexibility, maintainability, robustness and also the availability and capability of technical and managerial personnel (Kiggundu, 1989). Technological sustainability is fundamentally related to financial sustainability since the most visible cost usually comprises equipment and technical maintenance (Kumar, 2005).

(ii) Integrating the Five Sustainability Categories

Thus, for an ICT project to be sustainable, the five categories need to be integrated into the daily functioning of the involved project. Social and cultural contexts, within which the project is operating, need to be clearly defined and equity among members in accessing services be ensured. Governing institutions need to ensure smooth running of the project activities while developing the capacities of project members. The project management needs to seek for political acceptance of the ICT project as among the ways of expanding the project and sustaining the project activities. Technologically, an ICT project supplied with durable hardware and up-to-date software can ensure smooth running of the project activities. Lastly, a well thought entrepreneur idea to ensure the ICT project generates income to cover

for its operational and maintenance costs while leaving the surplus will ensure for its financial sustainability.

5.3. Conclusion

Back to the developed framework, it is evident that much has to be done to ensure rural farmers have access to markets and market information for the crops they are growing and selling. The study has indicated that different resources are involved in building the capability of an individual farmer to be capable to access and utilize agricultural market information. The different resources are translated into different sectors that are charged with different functions in fostering developments.

The framework reminds us that the poor need not only the social and financial resources, but also other resources like education, information, geographical, material, cultural, natural and psychological. Thus, in government plans for development, the poor need to be considered in all these areas. All these resources can help to develop the capabilities of the poor to live the lives they have reason to value. Technologies such as ICTs have the potential to facilitate positive development processes.

When governments are planning for rural development, agriculture should be considered as majorities are employed in this sector. Thus, care should be taken to ensure proper resources are considered for improvements. For example, farmers may be provided with fertilizers but due to poor knowledge on best farming practices, such fertilizer may be misused. Identifying resources of the poor to be improved is a step forward in creating awareness for agricultural development. Also, when designing policies and strategies for agricultural development, it is important to identify resources that are important to be worked on.

The sustainability issues have also been explored, and are relevant during the running of the project. Categories and issues relevant for success of the ICT initiatives have been discussed including the social and cultural, institutional, technological, political and financial aspects. It is assumed that once an individual is empowered, s/he becomes capable of managing his/her life and generating income from agricultural marketing activities. Also, an empowered individual becomes financially better to facilitate the development of his/her other resources.

Among the challenges of the developed framework are its adoption and implementation by stakeholders including the governments. Developing countries may find it difficult as they are tasked with many development programs with limited budgets and thus find it difficult to

finance the framework adoption and implementation. Sometimes, possession of one resource may facilitate the development of others. For example, an individual who has attended school (i.e. have educational resource) may easily possess the informational resource (i.e. ability to access, analyse and use information).

CHAPTER SIX

MEASURING INFORMATIONAL CAPABILITIES: A CASE STUDY

ABSTRACT

This chapter is motivated by much interest in the capabilities approach to developing capabilities of smallholder farmers in agricultural marketing to make them more effective market participants. It aims to validate the previously developed framework by measuring the informational capabilities of smallholder farmers who have utilized the prescribed program NINAYO in agricultural marketing. The measurement is interpreted as assessing whether access to agricultural market information provided through ICTs can enhance the agricultural marketing activities of smallholder farmers and thereby improving their agricultural production. Questionnaire for data collection was developed based on capability indicators identified from the four dimensions of informational capabilities (i.e. informational, psychological, social, and economic). Data from smallholder farmers who have accessed the NINAYO program were collected and analysed using Regression analysis (Ordinary Least Squares, Backward Elimination, and Ordered Logit Model). Without introducing any control, analysis showed that about half of the variation (i.e. 53.8%) in the dependent variables (indicators) was explained by the model. Backward elimination exercise trimmed the variables to thirteen indicators, drawn from different dimensions, with coefficients that are significant at the 5% level. Among the three control variables (age, gender and educational level) introduced in the model, only educational level causes some variables to become insignificant. Lack of similarities was observed in indicators when the sample was sub-grouped based on gender and age and analyses done. This concludes that informational capabilities is a multi-dimensional, involving its different dimensions.

6.1. Introduction

Recently, there is growing body of literatures examining and conceptualizing the concept of informational capabilities in different perspectives. Researchers, scholars and practitioners have been examining the concept of informational capabilities from multiple perspectives including productivity; organizational change, efficiency and performance (Haefliger *et al.*, 2011; Hwang, 2011; Lee and Lee, 2004; Leonardi, 2007; Li *et al.*, 2009; Zárraga-Rodrígueza and Álvarezb, 2014); businesses and marketing (Daugherty *et al.*, 2009; Zárraga-Rodríguez and Alvarez, 2013), educational development (Ndukwe *et al.*, 2007); process transformation;

power relationships, empowerment and capability development (Gigler, 2011). A thorough review of extant and existing literatures reveals conflicting definitions of the concept of informational capabilities in technology. Thus, this concept is not well defined, its constituents are not clear, and there is no consensus on how it can be measured.

Informational capabilities have been linked to different achievements. Bharadwaj (2000) argues that the firm-wide informational capabilities create superior firm performance, Marchand *et al.* (2000) notes companies that use information effectively achieve better business performance and Li *et al.* (2009) concludes that businesses with higher informational capabilities are more likely to achieve higher performance gains. Also, Zárraga-Rodríguez and Alvarez (2013) noted that informational capabilities is a source of competitive advantage and helps companies to achieve higher levels of efficiency. A study by Ross *et al.* (1996) linked informational capabilities to lowering transaction costs and as a means of building customer base. Improvement in an organization's informational capabilities can lead to changes in the social structure of an organization (Leonardi, 2007). To an individual or group, improvement in informational capabilities: leads to job creation and wealth, improves self-confidence, and enhances the social aspect (i.e. connectedness), skills and knowledge.

This concept of informational capabilities was introduced in the previous Chapter while employing the capability approach in developing the framework for accessing agricultural markets and using market information. The concept has been defined in terms of management (Grover and Malhotra, 1999; Lee and Lee, 2004; Li *et al*., 2009; Marchand *et al*., 2000; Zárraga-Rodríguez and Alvarez, 2013) and technology (Haefliger *et al.*, 2011). Further, the definitions indicate informational capabilities is defined in two contexts: individual person (Gigler, 2011); and organization (Grover and Malhotra, 1999; Haefliger *et al.*, 2011; Lee and Lee, 2004; Li *et al.*, 2009; Marchand *et al.*, 2000; Zárraga-Rodríguez and Alvarez, 2013) . This study adopts a definition by Gigler (2011) which explicitly describes the role of the user, application of technology, processes involved and achievements while others definitions are missing some of these items. Also, the definition by Gilgler is adopted as this study will measure the capability of an individual smallholder farmer and not for an organization or community or group. In literatures and text, the terms informational capabilities and information capability are used interchangeably and this study has adopted informational capabilities as a matter of structure in English grammar. The concept has been differently

defined by scholars as presented in Table 15.

Table 15: Definitions of informational capabilities in literatures

Authors	Conceptual Definitions
Gigler (2011)	Refers to a person's capability, or ability, (a) to use ICTs in an effective manner (ICT capability); (b) to find, process, evaluate, and use information (information literacy); (c) to communicate effectively with family members, friends, and professional contacts (communication capability); and (d) to produce and share local content with others through the network (content capability).
Grover and Malhotra (1999)	Refers to an organization's ability to acquire, process, and transmit information to support decision-making.
Haefliger *et al.* (2011)	Refers to an information technology's potential to alter the storage, transmission, and creation of information in an organization.
Lee and Lee (2004)	Refers to information quality, effective use of information, user satisfaction with information, etc.
Li *et al.* (2009)	A firm's ability to capture the complete behaviour information in regard to what, where, when, how, and whom of their customers.
Marchand *et al.* (2000)	The ability to provide data and information to users with the appropriate levels of accuracy, timeliness, reliability, security, and confidentiality; provide universal connectivity and access with adequate reach and range; and tailor the infrastructure to emerging business needs and directions (Cited by Jaca *et al.* (2016)).
Zárraga-Rodríguez and Alvarez (2013)	The management, distribution and efficient use of information.

Based on the adopted definition, informational capability in agricultural marketing can be described as the capability, or ability of smallholder farmers, to use ICTs in an effective manner, to find, process, evaluate, and use agricultural market information, to communicate effectively with other actors, and to produce and share local agricultural market information with others through the network. The description identifies smallholder farmers as producers and users of agricultural market information and measures their capability or ability in finding, processing, evaluating and communicating such information in the process of accessing markets for their agricultural produce. Back to the developed framework,

informational capabilities are regarded as a resource or asset of farmers who can choose different ICT tools for accessing agricultural market information for their produce. The achievements are distinct including more income, increased productivity, quality produce, enhanced confidence and motivation, more voice and improved connectedness and socialization.

In literatures and real applications, the terms Informational Capital, ICT Capabilities and Informational Capabilities may confuse and thus need one to carefully differentiate them. With Informational Capital, both definitions provided by Odero (2006) and Gigler (2011) are compatible and explained it as a level of livelihood resources or assets a person has at his/her disposal in terms of information. In modern economy, businesses that make good use of information remain competitive in the markets (Odero, 2006). Better management of informational capital can directly influence organization's business performance (Sabherwal and Kirs, 1994). Gigler (2011) and Kennewell *et al.* (2002) described ICT Capabilities as the ability of a person to use computer hardware, software, and ICT tools to carry out worthwhile activity to achieve his/her objective. Access and use of ICTs, for instance, provide opportunities to enhance service deliveries in other sectors such as education, health, businesses and in governments. A thorough analysis reveals that a person with a high level of ICT Capabilities can: (a) use common ICT tools, (b) use ICTs to support different activities to achieve objectives, (c) use current ICT hardware and software and understand its potentials and limitations, and (d) understand that using ICTs affects social processes.

The definition of informational capabilities, based on Castells (1995), Horton Jr (1983) and Gigler (2011), is much broader and relates to the role of information itself and a person's ability or capability to analyze and place information into his/ her own socio-cultural context. The concept resembles information processing capacity discussed by Galbraith (2008) and focuses on information technologies, that is, computer and communication hardware and software (Sabherwal and Kirs, 1994). Thus, availability of ICT infrastructure, access to ICT technology, human ICT skills, and specific software and application programs are important ingredients in creating informational capabilities of individuals and communities.

The socio-economic factors and the local institutional structures are important in developing the informational capabilities of an individual in accessing, using, processing and sharing information resources. Local environment and indigenous knowledge of an individual can act to strengthen the individual's ability to use information and thus constitute on the

enhancement of his/her informational capabilities. Furthermore, the way information is made available to users within the community can act as impediment and barriers to developing individual's and community informational capabilities. Barriers to information can stem from social and institutional structures (Mansell, 2002), manifested in lack of affordability and relevant content, language issues, low functional literacy, attitudes, culture, lack of time or lack of interest (Chand *et al.*, 2005; Kuriyan and Ray, 2009; Moyi, 2003; Parkinson and Lauzon, 2008; Tiwari, 2008; Van Dijk and Hacker, 2003; Warren, 2007) cited by Grunfeld (2011). In some cases, users can consider ICT tools as a western technology that undermine their traditional ways of communication and thus refrain in adopting modern technologies. This means, care should be taken when introducing technology to the community by studying the cultural and traditional values of the society while involving the local citizens.

But how can technology be introduced and adopted by local people in a society? How can we measure the informational capabilities of the local people after introducing technology to local society? The following sections will discuss (a) how technology can be introduced into the society, (b) how to measure informational capabilities and (c) a case study of measuring informational capabilities with respect to access and use of agricultural market information by smallholder farmers.

6.2. Introducing ICTs to Communities

Some literatures (Duncombe and Heeks, 2002; Heeks, 2001; Madon, 2000; Oreglia and Srinivasan, 2016) have called organizations that introduce ICTs to local communities ICT intermediaries. Heeks (2002a) described that these are organizations (or individuals) which can act as gatekeepers between cyberspace and the organic, informal information systems of those on the wrong side of the digital divide. Sambasivan *et al.* (2010) describes a process of ICT intermediation as what "occurs when the primary user is not capable of using an ICT device entirely on his/her own" (cited by Oreglia and Srinivasan, 2016). Intermediaries can offer physical access to ICT (e.g. Internet), facilitate access to ICT services by providing access points (e.g. telecentres), create awareness to ICT, and facilitate use by providing funds and training. These intermediaries can be individuals (e.g. entrepreneur running an internet café, government official, experienced user), and organizations (e.g. NGOs, government office, private companies).

The motives of providing ICT intermediation may be for profit, development objectives and

political drives. Role of intermediaries has intended consequences, such as teaching other people how to use ICTs, but also unintended ones, such as the negotiation and restructuring of power structures within the family and society (Oreglia and Srinivasan, 2016). ICT intermediation is needed to overcome the barriers of cost, skills and absence of many other resources required to turn information into decisions and actions (Duncombe and Heeks, 2002). Effective ICT intermediaries must provide not just technology but also the data, economic, social and action resources that are required to turn data into learning, decisions and actions of value (Heeks, 2002a).

Information and communication technology intermediation intiatives are many, especially in developing countries. In Tanzania, telecentres were established in some districts including Sengerema, Kilosa, Kasulu, Karagwe, Songea, Rural Dodoma, and Moshi Rural with the aim of disseminating agricultural information to rural poor (Lwoga, 2010). Also, community radios have also been effective in disseminating agricultural information such as Orkonerei Radio Station in northern Tanzania, Sengerema Community radio, and the Tanzanian's Northern agricultural research institute (Lwoga *et al.*, 2011). Worldwide, many examples of ICT intermediation are cited to indicate efforts of linking rural communities with information.

Following Kabeer (2001), we understand that "expansion in people's ability to make strategic life choices in a context where this ability was previously denied to them" emphasizes process of change rather than outcome. The ultimate goal of the process of ICT intermediation should be empowerment and one should note that empowerment is an ongoing process which is dynamic. It is anticipated that access to agricultural market information by rural farmers can enhance their capabilities in agricultural marketing activities and thus help them to rip from their investments in agriculture. However, literatures are yet to evaluate the real impact of these ICT intermediation projects and initiatives. Some scholars (Blommestenin *et al.*, 2006; Chapman *et al.*, 2003; Meera *et al.*, 2004) have demonstrated that use of ICTs in accessing agricultural market information can improve agricultural productivity and in turn reduce poverty. Not so much has been written in Tanzania with respect to ICT intermediation. Some scholars (Furuholt and Kristiansen, 2007; Mercer, 2006; Nielinger, 2003) have analyzed utilization of telecentres, Batchelor *et al.* (2005) have analyzed use of community television and radio by poor, while Goodman (2005) analysed the social impact of mobile phones. Some scholars (Chilimo, 2008; Kiondo *et al.*, 2010;

Mwakaje, 2010; Samuel *et al.*, 2005; David *et al.*, 2005) have analyzed the socio-economic impact of ICTs. This chapter adds by filling the remaining gap of measuring the informational capabilities of smallholder farmers who are accessing agricultural market information in their agricultural marketing dealings.

6.3. Measuring Informational Capabilities

The measurement of capabilities is the most pressing challenge ahead for the operationalisation of the capability approach. Scholars have investigated and measured technological and informational capabilities of organizations (Archibugi and Coco, 2005; Dutta *et al.*, 2005; Hwang, 2011), firms (Chae *et al.*, 2014) and even individuals (Yoon and Lee, 2008). Comim (2008) claimed that the idea of measurement would seem prima facie inimical to the capability approach. Based on Comim claims and the existing literatures, it is evident that there is no standards in measuring capabilities in respect to individual, or organzations.

Abundant list of scholars have attempted to conceptualize the measuring of capabilities. While exploring the concept of information orientation, Marchand *et al.* (2000) associated such concept with managerial perspective and introduced the concept of information competences. Marchand *et al.* (2000) went on explaining that information competences facilitate effective use and management of information and comprise of three informational capabilities namely IT Competence, Information Management Competence, and Information Behaviours and Values Competence. Later, Marchand *et al*. (2000) broke down the three competences into 15 practices that can be observed and measured. Zárraga-Rodríguez and Alvarez (2013) adopted this approach in their study and found that companies do develop more competences in information management, rather than in information technology or information behaviours and values.

Using the five major components of compentency (motives, traits, self-concepts, knowledge, and cognitive and behavioral skills) described by Spencer and Spencer (1993), Yoon and Lee (2008) developed a competency based tool for measuring end-user information capability. Yoon and Lee (2008) generated 32 items to measure end-user information capability based on the 5 components of individual competency described by Spencer and Spencer (1993). The analysis by Yoon and Lee (2008) resulted into four (4) factor groups that are potential for measuring end-user information competency including 16 measurement items. These factors

are information mindset, information technology and knowledge, information application capability, and potential information capability.

The methodological approach of measuring capabilities is well captured by Comim (2008) who desribed four (4) steps that can be adopted while measuring the capabilities as outlined below:

(i) clarification of concepts - consists in clarifying terms and hypotheses to get the concrete meaning of some abstract terms,
(ii) specification of dimensions that will be chosen as the focal point of analysis – measurement entails the specification of the dimensions to be measured. This choice involves the election of some classes of value at the expense of others,
(iii) choice of categories to represent the scales in which the evolution of dimensions would be assessed – measurement requires choice of scales. These scales do not always need to be translated into numbers, and
(iv) organisation of results - measurement involves a coherent or systematic way of displaying the results. This is important because results tend to be sample-sensitive and the characterisation of particular realities needs to reflect a story behind the measures. Theories will then guide the final organisation of results.

6.3.1. A Measurement Framework

Based on the above analysis and the framework developed in the previous Chapter Five, this chapter will lay down a foundation for measuring informational capabilities of smallholder farmers in agricultural marketing. This section is based on the assestion that improved access to agricultural market information provided through ICTs can enhance the agricultural marketing activities of rural smallholder farmers and thereby improving the agricultural production. The capability approach is very suited in this respect of measuring such informational capabilities of the smallholder farmers while considering that ICTs are multisector and have simultaneous impacts on other aspects of life (e.g economic, social, human).

When measuring informational capabilities, analysis can be centred on individuals or collective groups (household, household cluster, village, region, organization or community) (Scoones, 1998). Information and communication technology impacts analysis need to consider the fact that when utilized, can facilitate the expansion of capabilities of smallholder

farmers to realized improved economic, social and cultural opoortunities. Though information, knowledge and technology are important to development, their access and use are affected by the economical and social inequalities within the society (Mossberger *et al.*, 2007; Warschauer, 2004).

Information and communication technologies facilitate the enhancement of the capabilities by transforming the available data into useful information and knowledge and are not the means to an end by themselves. Access and use of ICTs can be facilitated by other resources such as economic and human factors. The capability of individuals and social groups to transform valued functionings into realized functionings depends on the combination of a person's existing livelihood resources or capital and his or her human agency. Therefore, the expansion of capabilities strengthens people's capital. It should also be noted that capability is a source of competitive advantage for an individual, social group and a firm and allows the generation of value and differentiation through the combined use of a series of resources (Zárraga-Rodrígueza and Álvarezb, 2014).

Gigler (2014) improved the Sustainable Rural Livelihoods framework by Scoones (1998) and produced a framework in Table 16**.** which can assist in discussing and analysing the impact of ICTs to an individual smallholder farmer. Scoones (1998) made a thorough analysis of poverty reduction using a sustainable livelihood approach. Based on the framework, an important question to ask is: Does the expansion of informational capabailities of an individual lead to the expansion of other capabilities? or simply put it, does strengthened capabilities of individuals to make meaningful use of information expand their capabilities to achieve valued functionings in other areas? In this respect, individuals are poor smallholder farmers living in rural areas.

The above question can easily be answered by employing Sen's concept of the role that human capital plays in enhancing person's ability not only to generate income, but also to lead a freer and more fulfilled life and to reach his/ her valued functionings (Sen, 1997). In this sense, the focus is on the role of human capabilities as an agent for bringing about social change. To put it right, this Chapter will study informational capabilities of an individual in order to understand its effect (expansion) on other aspects (capabilities) of human life. Some (Bharadwaj, 2000; Marchand *et al.*, 2000) have concluded that there is a relationship between informational capabilities and human capabilities.

Within the process of ICT intermediation, two concepts are important. First, ICTs need to be appropraited locally so that the poor communities reap from their ICTs uses. This can involve adopting and adapting ICTs by individuals and intergrate them into their lives, works, practices and (works) routines (Janneck, 2009). Over time, people can be thought of as taking possession of the ICT technology. Second, information provided by ICTs need to be contexualized to be relevant and meaningful to local communities or recipients. Contexualization of information can help to improve individual's understanding of the information contents, and reduce the individual's cognitive distance (i.e. difference in knowledge between the individual and the information provider) (Alpay *et al.*, 2009). Local appropriation of technology and contextualization of information provided by ICTs can help to do away with challenges such as language barriers, irrelevant contents, and online hackers.

Table 16: Empowerment through ICTs framework

Context	Capitals	Institutional Processes	Capabilities	Outcomes
Social-economic conditions Cultural Context Political Context ICT	Economic Capital Natural Capital Human Capital Social Capital Informational Capital Psychological Capital Material Capital Geographical Capital Cultural Capital	Existing social structures Introduction of ICTs	Economic Social informational Pyschological Cultural	Informational Capabilities Strenghened Human Capabilities Strenghened Social Capabilities Strenghened

Source: Gigler (2014)

The framework in Table 16 identifies five (5) dimensions that are considered during the process of individual empowerment. These are informational, psychological, social, economic and cultural. These enhance the person's individual human capabilities in different ways. Establishing indicators of outcomes for each of these items requires a precise answer to the question: What is a capability? The analysis of these items can stress on their

interdependency while investigating whether or not they reinforce each other. The following section will discuss on how to identify and develop indicators for measuring information capabilities based on the four dimensions: informational, psychological, social, and economic. The cultural dimension is preseved as it is more specific to a segment of people.

6.3.2. Development of Capability Indicators

Indicators are important in evaluating the level of development of capabilities and for assessing the impact of introducing/using ICTs to the individual and the community. They are important in indicating the performances, and can play a role in developing a national agenda of implementing ICTs in service delivery. Thus, indicators need to capture significant aspects of capabilities and must have a clear normative connonation. Some underlaying principles may be employed when constructing indicators for measuring capabilities.

Potentially, indicators have great values in pointing to significant problems, and when taken collectively, they allow us to draw conclusions about developmental progress. Indicators are not expected to give a complete representation of the state of the problem and its developmental progress after intervention. They are simply an indication (Atkinson and Marlier, 2010). The nature of that indication will depend on the choices of indicators made with regard to definitions and with regard to data (Atkinson and Marlier, 2010).

In developing capability indicators, Anand *et al.* (2009) insist that method employed to generate a set of capability variables (i.e. indicators) should have some grounds for being viewed as principled. This study will adopt the principles laid down by Atkinson *et al.* (2002) when developing social indicators as part of social agenda in the European Union. As the aim of this section is more pragmatic to the development of capabilities' indicators, indicators will not be discussed in general, rather their use in measuring informational capabilities in agricultural marketing.

Informational capabilities' indicators are concerned with developmental outcomes, rather than agencies and transforming structures that facilitate the development of capabilities as the aim is to measure the outcomes and not the means by which they are achieved. The following principles (revised version of Atkinson *et al.* (2002)) will be adopted while developing the indicators.

(i) An indicator should identify the essence of the problem and have a clear and accepted normative interpretation

When developing indicators, we focus on a certain aspect of the problem while excluding others but with central concern in mind. Indicators should be meaningful and clear to users of all kinds. Indicators should also produce results that are reasonable to the public and that represent users' views. An indicator that shows ICTs have not impacted to the lives of the poor can be regarded as inflated and misleading. Indicators should also be selected to have a clear normative interpretation. Agreement can be such that movement in a certain direction should be regarded as improvement. For example, use of ICTs in accessing and communicating agricultural market information can be regarderd as improvement.

(ii) An indicator should be robust and statistically validated

Data employed in measuring the level of indication should be regarded as statistically reliable and should avoid arbitrary adjustments. The methods adopted in data collection should minimize errors arising from ambiguous questions, misleading definitions, bias resulting from non-response, and interviewer or coder mistakes. Indicators should as far as possible be validated by reference to other evidence. Indicators derived from one sample in one region can be cross-checked against information available from another sample in a different region. Any indicator will necessarily involve some errors, but it should not be systematically biased. It must also be statistically reliable over time in the sense that results must not be liable to unpredictable or inexplicable fluctuations.

(iii) An indicator should be responsive to research goals but not subject to manipulation

Indicators must reflect the successful intervention of researches. Also, indicators must be of a form that can be linked to research initiatives. At the same time, indicators should not be easily manipulable.

(iv) An indicator should be timely and susceptible to revision

Measurement for indicators should use the highly current information.

Indicators can be of different types and can also have different properties. Atkinson *et al.* (2002) has fully discussed the properties that social indicators might usefully possess. Robeyns (2005b) has cogently argued that different accounts or lists (capability indicators) may be appropriate for different purposes so that the idea that there should be one single list for all purposes is questionable. For example, the items for inclusion on a list may vary across cultures.

Based on the four dimensions (informational, psychological, social, and economic), indicators for each are constructed based on stated objective(s), experience and reading from other scholars' works. Table 17 summarizes the list of indicators for each dimension based on the stated objective.

(i) Informational Dimension

With informational dimension, the ultimate is to ensure individuals are able to use ICT devices and can access various information (including agricultural market information) that is relevant to their daily dealings and well-being. Based on the definitions of informational capabilities (in Table 15) and other scholarly works, users are expected to have capacity to use different ICT devices (Gigler, 2011); build and enhance their informational literacy (i.e. ability to find, locate, access, process, evaluate and use information) (Catts and Lau, 2008; Gigler, 2011; Lee and Lee, 2004); recognize the needs for information (Li *et al.*, 2009); communicate information using ICTs (Gigler, 2011); and make effective and ethical use of information (Marchand *et al.*, 2000).

(ii) Psychological Dimension

With psychological dimension, ICTs can play a direct role in enhancing well-being through a process of "self-reflection" and "critical analysis" of the critical consciousness and self-esteem of poor people (Freire, 1972). Psychological empowerment through ICTs can be interpreted as transforming skills into actions to produce a self-determined change. Grant *et al.* (2002) described self-reflection as the inspection and evaluation of one's thoughts, feelings and behavior and insight, the clarity of understanding of one's thoughts, feelings and behavior. The intrapersonal component of the Zimmerman's model of psychological empowerment describes how people think about themselves and includes domain-specific perceived control and self-efficacy, motivation to control, perceived competence, and mastery (Zimmerman, 1995). In their classic work on empowerment, Thomas and Velthouse (1990) illustrate the essence of psychological empowerment as a sense of meaning, competence, self-determination, and impact.

A work by Maier and Seligman (1976) on psychological empowerment suggests empowerment as actions that strengthen the values of self-sufficiency or that weakens learned helplessness. The nature of psychological empowerment process is characterized as being motivating based and focuses on improving individuals' subjective interpretations (e.g. self-confidence, self-awareness, assertiveness) so that they feel in control of their own destiny

(Spreitzer and Doneson, 2005; Thomas and Velthouse, 1990). Other examples of outcome indicators for the psychological empowerment of smallholder rural farmers, through ICTs, include improved ability to analyze one's own situation and solve problems, providing emotional support (Kieffer, 1984), cultivating a supportive climate (Spreitzer, 1996), stronger ability to influence strategic life choices, bridging social divisions, and facilitating others' empowerment (Christens, 2012), stronger self-esteem (Aji *et al.*, 2010; Leung, 2009) and sense of inclusion in the "modern" world.

(iii) Social Dimension

In economics, capital refers to factors of production used to create goods or services. The human takes charge of all economic activities such as production, consumption, and transaction. The success of economic activities depends in large part on the people with higher level of competence. In response, the people are becoming valuable assets. Thus, human capital is also a production elements which can generate added-values through inputting it. Human capital is defined as "the skills the labor force possesses and is regarded as a resource or asset" (Diebolt *et al.*, 2014). It encompasses the notion that there are investments in people (e.g. education, training, health) and that these investments increase an individual's productivity (Diebolt *et al.*, 2014).

Human empowerment through ICT can be interpreted as strengthening people's human capital (skills, knowledge, ability to work, and good health) to increase individual's or collective productivity. Human capital affects the growth of an individual, firms' productivity, and national economy. Specific outcome indicators for the human empowerment of rural smallholder farmers through ICTs include the enhanced ICT literacy and technology skills (e.g. use of ICT devices), enhanced leadership skills, and improved program management skills.

(iv) Economic Dimension

Use of ICTs can also foster development of an individual and of the community, thus contributiong to their economies. Information and communication technology can produce postive results when it is fully integrated into daily dealing and in service deliveries. Among the possible benefits of using ICTs include reduction of transaction costs and uncertainty (reduced need for travel, quicker access to information, and more choices); reducing the isolation of many in rural areas (Aminuzzaman *et al.*, 2003); and making informed decisions

around supplies, prices, markets, and rural services which directly affect their livelihood Rahman *et al.*, 2013). Other benefits include negotiating prices, disseminate information, develop marketing linkages, or interact with different actors (Rahman *et al.*, 2013; Sey and Fellows, 2009; Ulrich, 2004). Based on these benefits, one can claim that ICTs can

Table 17: Outcome indicators of individual empowerment and human capabilities

Dimension	Objective	Indicators
Informational	To improve the access to information and informational capabilities	– Ability to use different forms of ICTs – Enhanced information literacy – Recognize information needs – Ability to find, locate and evaluate the quality of information (Catts and Lau, 2008) – Make effective and ethical use of information – Apply information to create and communicate knowledge
Psychological	To support a process of self-reflection (critical conscientization) and problem-solving capacity	– Increased sense of self-worth – Stronger self-confidence, self-awareness, assertiveness – improved ability to analyze one's own situation and solve problems, providing emotional support – stronger ability to influence strategic life choices, bridging social divisions, and facilitating others' empowerment – stronger self-esteem – Sense of inclusion in the "modern" world
Social	To strengthen people's human capital (skills, knowledge, ability to work, and good health)	– Involvement in informal and formal networks, use of ICTs to communicate with neighbours and engaging with recreational activities (Grootaert *et al.*, 2004). – linking individuals in communities for more effective participation (Bebbington, 1999). – Online interactions to enable identification of peers with similar interests for sharing experience, knowledge and entrepreneurial skills (Melissa *et al.*, 2015).
Economic	To enhance people's capacity to interact with the market	– Use of ICT to market products (Melissa *et al.*, 2015). – improved access to markets for different farm produce, – enhanced entrepreneurial skills using ICTs, – more income from sales of farm produce (lower transaction costs, reduced transport costs, and increased timeliness of sales), – more investment in agricultural production, and – Dependence of ICTs in daily dealings.

economically empower an individual based on the following indicators: improved access to markets for different farm produce, and enhanced entrepreneurial skills using ICTs (Ahmed *et al.*, 2006), more income from sales of farm produce (lower transaction costs, reduced transport costs, and increased timeliness of sales) (Ahmed *et al.*, 2006; McClure *et al.*, 2001),

more investment in agricultural production, and dependence of ICTs in daily dealings (McClure *et al.*, 2001). Benefits from which indicators can be derived include increased access to markets (Ahmed *et al.*, 2006), and access to business, job and career support related information. Other indirect benefits are improved farming practices, access to business contacts, and creation of jobs (Ulrich, 2004).

6.3.3. Technique for Measuring Informational Capabilities

To measure capabilities is like measuring how people are satisfied with and experience their lives. This has been associated with subjective well-being (SWB) and is defined as a person's cognitive and affective evaluations of his or her life (Diener and Lucas, 1999). The cognitive element refers to what one thinks about his or her life satisfaction in global terms (life as a whole) and in domain terms (in specific areas of life such as work e.g. in agricultural marketing, relationships, etc.) while the affective element refers to emotions, moods and feelings (Diener and Lucas, 1999; Tinkler and Hicks, 2011). The three components of SWB are life satisfaction, positive affect, and negative affect. Affect is considered positive when the emotions, moods and feelings experienced are pleasant (e.g. joy, elation, affection etc.) (Binder, 2014; Tinkler and Hicks, 2011). Affect is deemed negative, though, when the emotions, moods and feelings experienced are unpleasant (e.g. guilt, anger, shame etc.) (Binder, 2014; Tinkler and Hicks, 2011). The three SWB components are independent factors that are measured and studied separately (Andrews and Withey, 1976; Diener and Lucas, 1999).

In his writings on human flourishing, Sen (1985b) suggests that evidence on what makes people happy can provide evidence about their true underlying values. In studying the concept of subjective well-being capabilities (SWC), Binder (2014) described it (SWC) as the substantive opportunities an individual enjoys to pursue and achieve happiness. In subjective well-being capabilities, individuals are treated as sovereign agents that are responsible for their own happiness (Binder, 2014). Capability scholars often include insights from subjective well-being research into their approach while others have explored the extent that capabilities have influenced subjective well-being.

Table 18: Capabilities, survey questions and variables – Informational dimension

Description	Survey question	Variable
To recognize information needs	Do you access the program with the purpose of getting agricultural market information for the farm produce you want to sell? *Yes = 1, No = 0*	Access purpose
Being able to find and locate information	Were you able to get the agricultural market information you were searching in the program? *Yes = 1, No = 0*	Ability to get search results
Being able to analyze interpret information	Were you able to analyze and interpret the agricultural market information you got from the program? *Yes = 1, No = 0*	Ability to analyze information
Being able to share information	Did you share with others the agricultural market information you got from the program? *Yes = 1, No = 0*	Ability to share information
Make effective use of the information	Did you use the agricultural market information you got from the program to negotiate for the price of the produce you wanted to sell? *Yes = 1, No = 0*	Use information to negotiate on price
Knowledge in agricultural marketing improved	Please rate how the program has enhanced your ability to find, locate and evaluate the quality of agricultural market information you are interested with. *Strongly agree = 5 Agree = 4 Undecided = 3 Disagree = 2 Strongly disagree = 1*	Enhanced ability to evaluate the quality of information
Knowledge in Internet search improved	Please rate how generally the program has enhanced your knowledge and skills in searching, locating and using information in the Internet. *Strongly agree = 5 Agree = 4 Undecided = 3 Disagree = 2 Strongly disagree = 1*	Enhanced Internet knowledge and skills
Enhanced confidence during the selling of produce	Please rate how the program has enhanced your confidence with the information you have during the selling of your farm produce. *Strongly enhanced = 5 Enhanced = 4 Undecided = 3 Not enhanced = 2 Not enhanced at all = 1*	Confidence enhancement
Being able to sell at different markets	Please rate how the program has enabled you to sell your farm produce at different markets depending on the information you have. *Strongly enabled = 5 Enabled = 4 Undecided = 3 Not enabled = 2 Not enabled at all = 1*	Sell produce at different markets
Being able to sell to different buyers	Please rate how the program has enabled you to sell your farm produce to different buyers depending on the information you have. *Strongly enabled = 5 Enabled = 4 Undecided = 3 Not enabled = 2 Not enabled at all = 1*	Sell produce to different buyers
Feeling of receiving better price	Please rate your impression whether the program has enabled you to receive better prices for your farm produce. *Strongly impressed = 5 Impressed = 4 Undecided = 3 Not impressed = 2 Not impressed at all = 1*	Impression for better price
Being able to negotiate the prices	Please rate your feeling whether your price negotiating skills has improved through the program. *Strongly improved = 5 Improved = 4 Undecided = 3 Not improved = 2 Not improved at all = 1*	Improved negotiating skills
Being able to make sales decision	Please indicate to what extent you agree or disagree with the following statement: Based on the information you get from the program, you can decide whom to sell to, where to sell, and the time to sell your farm produce. *Strongly agree = 5 Agree = 4 Undecided = 3 Disagree = 2 Strongly disagree = 1*	Sales decision making

To measure SWB, one can use the measure of life satisfaction. Life satisfaction measures are

perhaps the most well-known and commonly used evaluative measure because they are seen by policy makers as useful. Evaluative measures ask respondents to stand back and make an assessment of their lives and, in the case of life satisfaction, score their lives with regard to their satisfaction (Tinkler and Hicks, 2011). Tinkler and Hicks (2011) added that any measure of SWB should have a good theoretical underpinning and that for measures to be useful, they should be relevant to policy needs.

Table 19: Capabilities, survey questions and variables - Social and Psychological dimensions

Dimension Description	Survey question	Variable
Social	Please indicate how the program has enhanced your interaction with others for sharing entrepreneurial skills. *Strongly enhanced = 5 Enhanced = 4 Undecided = 3 Not enhanced = 2 Not enhanced at all = 1*	Enhanced entrepreneurial skills
Being able to share entrepreneur skills		
Empowered in agricultural marketing	Please indicate to what extent you agree or disagree with the following statement: Generally, use of the program has empowered you in agricultural marketing issues. *Strongly agree = 5 Agree = 4 Undecided = 3 Disagree = 2 Strongly disagree = 1*	Empowerment in agricultural marketing
Being able to communicate with others	Please indicate how the program has improved your ability to communicate with others on agricultural market information. *Strongly improved = 5 Improved = 4 Undecided = 3 Not improved = 2 Not improved at all = 1*	Improved communication
Being able to participate in community activities	Please indicate how the program has improved your participation in community activities. *Strongly improved = 5 Improved = 4 Undecided = 3 Not improved = 2 Not improved at all = 1*	Improved participation in community activities
Psychological	Please indicate how the program has enhanced your interaction with others for sharing experience. *Strongly enhanced = 5 Enhanced = 4 Undecided = 3 Not enhanced = 2 Not enhanced at all = 1*	Experience sharing
Being able to share experience		
Being able to interact with others	Please indicate how the program has enhanced your interaction with others for sharing knowledge. *Strongly enhanced = 5 Enhanced = 4 Undecided = 3 Not enhanced = 2 Not enhanced at all = 1*	Knowledge sharing
Feeling of inclusion in the modern world	Please indicate how the program has transformed your sense of feeling of inclusion in the modern world of science and technology. *Strongly transformed = 5 Transformed = 4 Undecided = 3 Not transformed = 2 Not transformed at all = 1*	Sense of inclusion in the modern

This study has chosen and adopted the measure of life satisfaction for measuring informational capabilities for a good number of reasons. A choice of this method is based on: (a) the concept of informational capability can be fairly precisely defined in subjective well-

being, (b) the phenomenon (capabilities) thus defined can be measured fairly well, (c) there are empirical data on this matter which allow answers to the questions raised, and (d) focusing on an "objective" conception of happiness would involve a priori answers to several of the questions under discussion.

Table 20: Capabilities, survey questions and variables – Economic dimension

Description	Survey question	Variable
Being able to market farm produce	Please indicate to what extent you agree or disagree with the following statement: At present you find it easy to market your farm produce when you want to sell. *Strongly agree = 5 Agree = 4 Undecided = 3 Disagree = 2 Strongly disagree = 1*	Easy to market farm produce
Being able to visit different market	Please indicate how the program has improved your ability to access different markets for your farm produce. *Strongly improved = 5 Improved = 4 Undecided = 3 Not improved = 2 Not improved at all = 1*	Ability to access different markets
Being able to lower transaction costs	Please indicate to what extent you agree or disagree with the following statement: The program has lowered the transaction costs and hence increased your income from sales of farm products. *Strongly agree = 5 Agree = 4 Undecided = 3 Disagree = 2 Strongly disagree = 1*	Low transaction costs
Being able to lower transport costs	Please indicate to what extent you agree or disagree with the following statement: The program has reduced the transportation costs and hence increased your income from sales of farm products. *Strongly agree = 5 Agree = 4 Undecided = 3 Disagree = 2 Strongly disagree = 1*	Reduced transportation costs
Being able to increase income	Please indicate to what extent you agree or disagree with the following statement: The program has increased the timeliness of sales and hence increased your income from sales of farm products. *Strongly agree = 5 Agree = 4 Undecided = 3 Disagree = 2 Strongly disagree = 1*	Increased income
Being encouraged to use ICT in delivering services	Please indicate how the program has encouraged you to use ICTs in other areas in delivering services. *Strongly encouraged = 5 Encouraged = 4 Undecided = 3 Not encouraged = 2 Not encouraged at all = 1*	Encouraged use of ICTs in delivering services
Being able to invest more in agriculture	Please indicate how appropriate you find to invest more in agricultural production as a result of the skills you have acquired through the program. *More appropriate = 5 Appropriate = 4 Undecided = 3 Not appropriate = 2 Not appropriate at all = 1*	More investment in agricultural production

In this study, SWB is measured by responses to the question: How satisfied or dissatisfied are you (i.e. smallholder farmer) with your informational capabilities after initiatives of accessing agricultural market information via technologies like ICTs? Based on the capability indicators identified in section 6.3.2, questions that were expected to be asked to smallholder farmers were constructed and the result of this activity is presented in Table 18 (informational

dimension), Table 19 (Social and Psychological dimensions), and Table 20 (Economic dimension). The first column of this table gives the dimensions and the descriptions of the questions, the middle column indicates how responses were coded for the purposes, and the last column gives a variable related to the concept to be measured.

6.4. Description of the Case Study

To accomplish the objective of this chapter of measuring the informational capabilities of individuals, the study utilized and examined the NINAYO program accessed via www.ninayo.com. (see Picture 2) NINAYO is an online trading platform providing the selling and purchase services of agricultural products to farmers and traders in Tanzania, and uses crowd-sourced data to provide actionable business intelligence for its users. The platform was launched in Tanzania in 2015 and its services are provided for free. NINAYO users, are typically small-scale farmers with an average annual income of TAS 1 274 000 ($637).

NINAYO founder, Jack Langworthy, has conducted business in the Tanzanian agriculture sector since 2009. NINAYO is a tool to solve specific problems that the founder faced in the agricultural sector, such as:

- Lack of supply visibility (buyers don't know what crops farmers are selling)
- Lack of demand visibility (farmers don't know how much buyers are willing to pay)
- Lack of logistical coordination (inefficient transportation skyrockets costs)

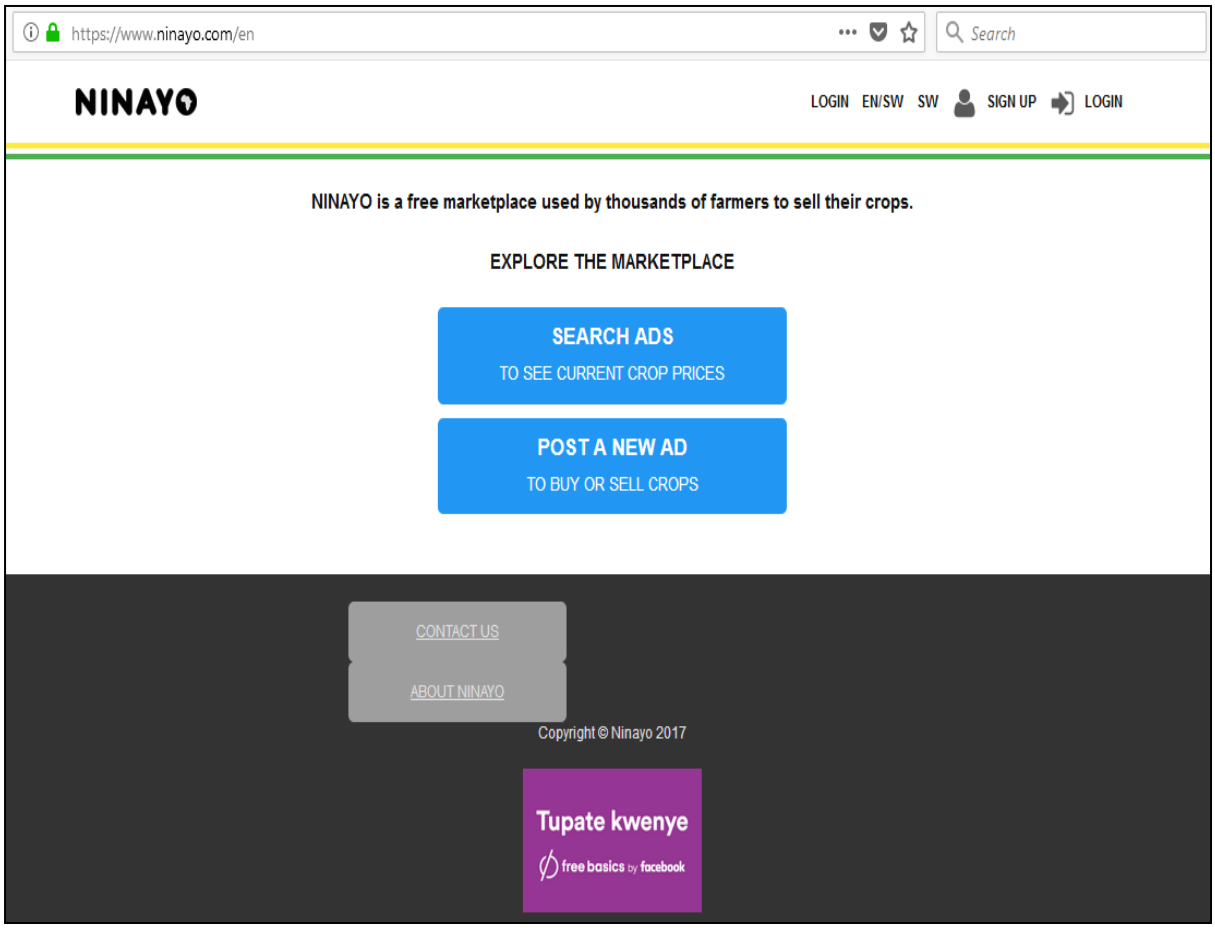
Based on understanding of emerging markets, Jack saw it was necessary to explain his value proposition. Jack considered that 80% of Tanzania's work forces are independent farmers. Farmers have little bargaining power over the sale of their crops due to poor infrastructure and a lack of communication with food processors (markets), and that Internet access has recently become widespread, even in poor and remote villages.

By enabling Tanzanian farmers to post their supply of crops, they gain access to a far wider range of demand. Food processors, likewise, have a much clearer view of the crops available in their regions. Each side of the value chain is incentivized to use NINAYO service. Over 30% of food riots in Tanzania, while malnutrition and poverty run rampant. If there were ever an industry in need of disruption, it's this one. By improving supply visibility, demand visibility and logistical coordination, more food will go to those in need at a fairer price.

Source: https://www.ninayo.com/en/splash/instructions

6.5. Method

Based on a list of indicators identified in section 6.3.2, a questionnaire was developed with questions that examined the informational capability of farmers. These questions were based on the four (4) dimensions proposed in section 6.3.2. For analysis, the measure of life



Picture 2: Screenshot of NINAYO front page

satisfaction referred to in section 0 is employed. With life satisfaction measure, the variables were measured on a standard, five-point Likert scale. Questions developed from the capability indicators plus a small number of socio-demographics comprised the survey instrument (questionnniare) (Appendix 3) that took approximately 15 minutes to complete.

6.5.1. Data Collection

For the purpose of data collection, respondents were identified with the help of two (2) NINAYO field officers. These field officers have a database of small-scale farmers and traders from different wards, districts and regions who access and use NINAYO platform. The field officers have also established three (3) WhatsApp groups and have registered both farmers and traders for sharing agricultural market information. The three WhatsApp groups

have about 470 participants.

With the help of the field officers, farmers were approached and requested to fill the questionnaires based on their experience on using the NINAYO program. Most respondents filled online questionnaires while a few filled printed ones. Field officers volunteered to elaborate some issues to respondents in case of difficulties during the filling of the questionnaires.

Table 21: Regions and districts from which respondents were drawn

Region / District	Arusha	Kilimanjaro	Mbeya	Morogoro	Ruvuma	Songwe	Total
Meru	23						23
Hai		32					32
Same		27					27
Kyela			26				26
Kilosa				43			43
Mvomero				61			61
Mbinga					40		40
Nyasa					32		32
Songea Rural					53		53
Mbozi						18	18
Total	23	59	26	104	125	18	355
Total (%)	6.48	16.62	7.32	29.30	35.21	5.07	100.00

6.5.2. Results

(i) Respondents

Sample respondents of this study were drawn among the small-scale farmers who have accessed and used the NINAYO program for agricultural marketing of their farm produce. As of this case, small-scale farmers from different wards in different districts in different regions in Tanzania were contacted to volunteer filling and completing the data collecting instrument. Table 21 shows targeted districts and regions from which sample respondents were drawn.

(ii) Characteristics of Respondents

A total of 355 respondents were involved in this phase of study as summarized in Table 22. The table shows gender, age, monthly income and educational level of respondents. Males were dominant (64.5%) while females were a few (35.5%). The dominance of males suggests that in a household, males are more concerned with agricultural marketing of farm produce than women. Ages of resondents were between 18 and 49 years. Based on age, results show

that majorities were youths with ages between 18 and 43 years, constituting about 99.2%. Results suggest that youths (i.e. below 40 years) are more used to technologies than elders as they volunteered more in filling and completing the questionnaires. Also, results from Table 22 reveal that rural farmers have different levels of education. As a results of the Tanzania

Table 22: Characteristics of respondents

Sex	R	%R
Male	229	64.50
Female	126	35.50
Total	355	100.0

Age	R	%R
Between 18 and 25 years	87	24.50
Between 25+ and 31 years	185	52.10
Between 31+ and 37 years	46	13.00
Between 37+ and 43 years	34	9.60
Between 43+ and 49 years	3	0.80
Total	355	100.00

Monthly Income	R	%R
Less than 300 000	67	18.87
Less than 400 000	104	29.30
Less than 500 000	70	19.72
Less than 600 000	57	16.06
Less than 700 000	39	10.99
Less than 800 000	12	3.38
More than 800 000	6	1.69
Total	355	100.00

Education Level	R	%R
Standard Seven	70	19.7
Form Four	83	23.4
Form Six	35	9.90
Certificate	111	31.30
Diploma	56	15.80
Total	355	100.00

Key: R - Respondents

governmnent's policy of educating its citizen, secondary schools were built in rural areas that absorbed majority of pupils who completed their primary school education (i.e. standard seven). Also, high schools and training institutes offering certificates and diplomas in different discipline were established. Thus, the sample constituted 19.7% standard seven, 23.4% form fours, 9.9% form sixs, 33.1% certificate holders and 15.8% diploma holders. It was not clear with certificate holders, as anybody attended a short time training like a month training claimed to have attained a certificate. In Tanzania, certificate holders are regarded as those who complete a year training after finishing their secondary school (form four) studies. During the data collection phase, majority of smallholder farmers failed to complete online forms as a result of poor or no knowledge of the Internet, despite possessing Internet enabled mobile phones. This failure to properly use technologies like the Internet is attributed to ICT

illiteracy.

Respondents also showed that their monthly incomes range between TAS 300 000.00 and TAS 800 000.00. All respondents identified agriculture as their main economic activity, though they also indicated other economic activities such as small-businesses, providing technical services, and engagement in informal employment. They also agreed that their incomes are greatly contributed by agricultual activities.

(iii) ICT Use among Respondents

To understand the knowledge of respondents in using ICTs, two sets of questions were asked. The first set explored the respondents' ownership of mobile phones, whether they can access Internet over their mobile phones, whether they attended any computer training and their ability in sending and receiving emails. The responses of the first set of questions are as -

Table 23: Respondents' ownership and use of ICTs

Item	Responses	Yes		No	
		Total	%Total	Total	%Total
Own mobile phone?		352	99.20	3	0.85
Mobile phone is Internet enabled?		352	99.20	3	0.80
Attended Computer training?		278	78.30	77	21.70
Can read and send emails?		335	94.40	15	4.20

summarized in Table 23 above. The second set of questions targetted to understand the repondents' knowledge on computers and Internet use. Questions asked (in Table 24) targeted to learn the respondents' knowledge on computer use and Internet, knowledge on use of search engine (i.e. google) for finding information, and use of social network (i.e. facebook) for sharing information and for communication. From the two sets, it can be concluded that ownership of ICTs (specifically mobile phones) have increased and even more

Table 24: Respondents knowledge on computer use and the Internet

Item	Responses	Best	Better	Good	Poor	Don't know
		T(%T)	T (%T)	T(%T)	T(%T)	T(%T)
Knowledge on computer use		169 (47.60)		147 (41.40)	30 (8.50)	9 (2.50)
Use of Google to search information		29 (80.00)	59 (16.60)		3 (0.80)	3 (0.80)
Use Internet to disseminate information		284 (80.00)	65 (18.30)		3 (0.80)	3 (0.80)
Use of social networks (e.g. Facebook) for communication		294 (82.80)			58 (16.30)	3 (0.80)

people (i.e. 99.2%) are owning Internet enabled mobile phones (i.e smartphones). Also, a good number of respondents (i.e. 78.3%) attended computer training and thus are acquainted with email (94.4%), have a good knowledge on computer use (i.e. 47.6% best, 41.4% good), can use Internet search engine such as Google (80.0%), and also can use social networks like Facebook (82.8%).

(iv) Access and Use of Information from NINAYO

Respondents indicated that different ICT devices are used in accessing agricultural market information from the program NINAYO. Devices mentioned include mobile phones, PCs and laptops. Length of using the program has been varying between a year and three years. Respondents also indicated that they access the program with the purpose of getting buyers of their farm produce. To learn respondents' access, use and experience of the program, various items were assessed as depicted in Table 25. Results show that respondents were able to upload into the program, the agricultural market information of their farm produce. Respondents were also able to find/search, get and analyze the agricultural market information relevant to their dealings. Also, respondents used the agricultural market information they got from the program to negotiate for the prices of their farm produce with agricultural traders and buyers. Further, results show that respondents were able to share with others the agricultural market information they got from the program.

Table 25: Access and use of NINAYO program by respondents

Item / Responses	Yes		No	
	T	%T	T	%T
Ability to upload into the program the agricultural market information	334	94.1	21	5.9
Ability to find from the program the agricultural market information	341	96.1	14	3.9
Ability to get search results	321	90.42	34	9.58
Ability to analyze information from the program	331	93.24	24	6.8
Use information from the program to negotiate on prices of farm produce	325	91.55	30	8.45
Ability to share with others information accessed from the program	329	92.68	26	7.3

Overall, results suggest that registered members of the NINAYO program effectively utilize it in accessing agricultural market information when selling their farm produce. Such accessed agricultural market information may influence the selling decision of the respondents as they indicated that they utilize such information for negotiating the prices with

traders while selling their farm produce. This access of agricultural market information links farmers with both distant markets and traders, and also enables farmers to learn various market variables at different markets.

(v) Measuring Information Capabilities of Small-Scale Farmers

The data collecting instrument generated a rich dataset through which a number of possible pathways are available. The target here was to understand the satisfaction which can be taken to explain the informational capabilities of an individual. The first task was to make analysis of the basic regression model and then to make additional analyses which can address the robustness and sub-population variation issues. During these analyses, the dependent variable was measures of satisfaction with informational capabilities, which was distributed as indicated in Fig. 17.

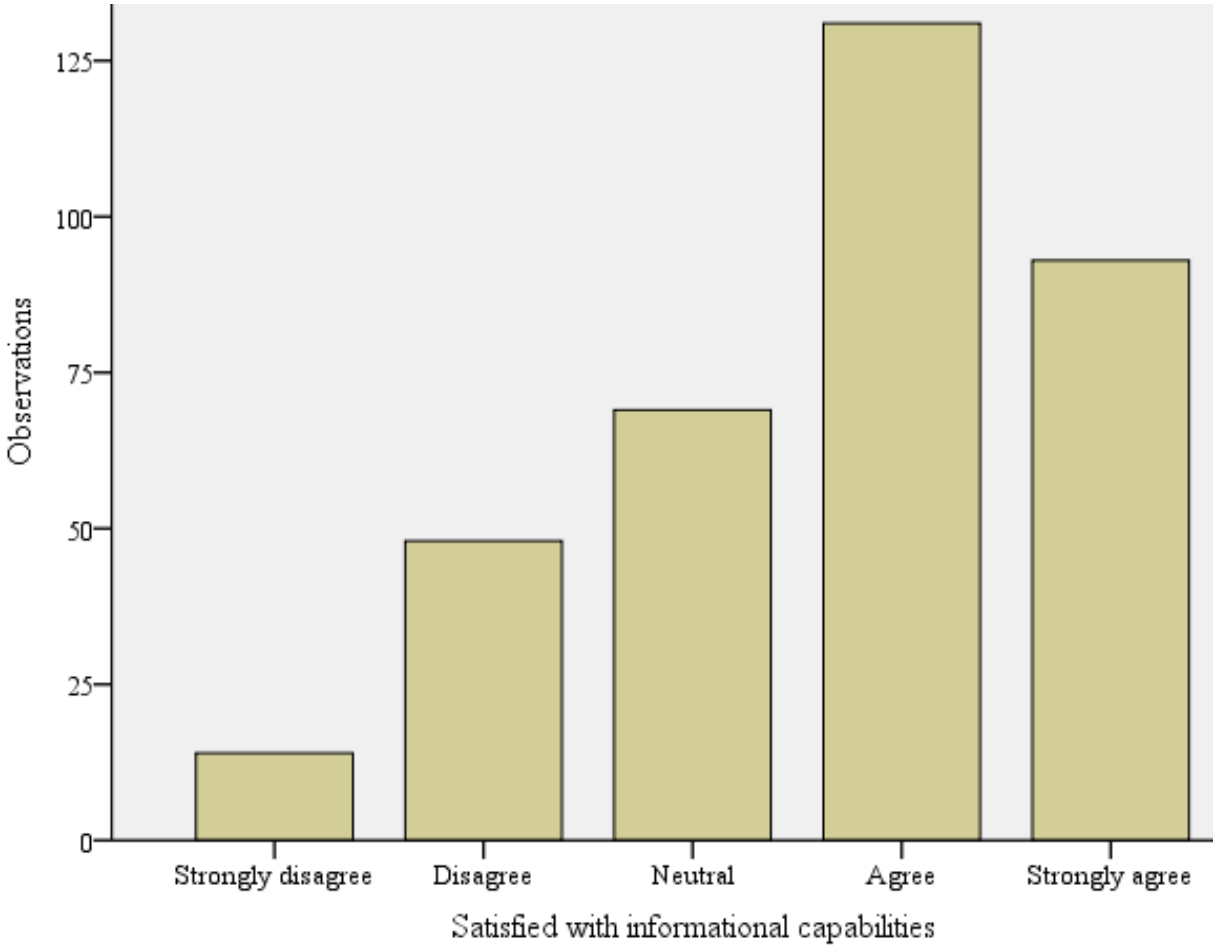


Figure 17: Distribution of informational capabilities

Table 26 presents the first model which depicts the ordinary least squares (OLS) of the dependent variable as a function of 27 capability indicators. The *R* value represents the simple correlation and is 0.733, which indicates a high degree of correlation. The R^2 value

indicates how much of the total variation in the dependent variable, can be explained by the independent variables. In this case, 53.8% can be explained, which is more than half. The coefficient represents values for the regression equation for predicting the dependent variable

Table 26: Regression of satisfaction with informational capabilities on capability indicators

Variable	Coefficient	Standard error	Sign. Value
Constant	2.209	0.357	0.000
Access purpose	-0.171	0.191	0.372
Ability to get search results	-0.182	0.258	0.482
Ability to analyze information	0.227	0.190	0.232
Ability to share information	-0.302	0.300	0.315
Use information to negotiate on price	0.920	0.273	0.001
Enhanced ability to evaluate the quality of information	-0.694	0.186	0.000
Enhanced Internet knowledge and skills	4.596	0.840	0.000
Confidence enhancement	-4.960	0.750	0.000
Sell produce at different markets	0.175	0.209	0.403
Sell produce to different buyers	0.911	0.370	0.014
Impression for better price	-1.088	0.272	0.000
Improved negotiating skills	0.583	0.186	0.002
Sales decision making	0.800	0.286	0.006
Enhanced entrepreneurial skills	-0.840	0.425	0.049
Empowerment in agricultural marketing	-0.247	0.367	0.501
Improved communication	-0.376	0.065	0.000
Improved participation in Community activities	-0.027	0.257	0.917
Experience sharing	0.548	0.255	0.033
Knowledge sharing	1.227	0.331	0.000
Sense of inclusion in the modern	-1.157	0.368	0.002
Easy to market farm produce	-0.188	0.417	0.653
Ability to access different markets	-0.450	0.435	0.302
Low transaction costs	-0.689	0.368	0.062
Reduced transportation costs	2.836	0.774	0.000
Increased income	-0.858	0.315	0.007
Encouraged use of ICTs in delivering services	0.446	0.460	0.333
More investment in agricultural production	-0.701	0.429	0.103
Observations	355		
R	0.733		
R Square	0.538		
Adjusted *R* Square	0.500		
Log likelihood	-361.698		

from the independent variables. The standard errors are associated with the coefficients. The significant value tests whether a given coefficient is significantly different from zero using an

alpha of 0.05. The constant under the coefficient column is the predicted value of the dependent variable when all other variables are zero (0). Results show that a number of capability indicators have significant coefficients while others do not have.

The second model (see column 2 of Table 27) depicts the results of backward elimination exercise meant to remove variables with insignificant coefficients. This model shows that thirteen (13) capability indicators, drawn from different dimensions of informational capabilities, have coefficients that are significant at the 5% level. These results are consistent with economic literature on poverty, which accepts that different sectors are involved in poverty reduction. Also, the results are consistent with psychological literature on happiness, which accepts that life satisfaction is multi-dimensional depending on different life domains.

To pursue how strong the second model is (i.e. robustness), we test whether introduction of different variables make an impact on its results. To learn the impact of other variables on the model, three social-demographic variables (gender, age, and education level) were added in as shown in Table 27. The introduction of the variables gender and age (column 3 of Table 27) causes no capability indicator to become insignificant, which confirms that satisfaction of an individual with his/her informational capability is not related with his/her gender or age. The control variables gender and sex are insignificant, even at 10% level. However, the introduction of the variable education level into the model (column 4 of Table 27) causes one capability indicator *Ability to analyse information* to become insignificant. The change of significant level as the introduction of another variable (i.e. education) confirms the fact that developing individual's information capability depends on his/her level of education. These findings confirm that informational capabilities depend on level of education and thus during its measurements, one needs to consider the inclusion of such a variable. It is also interesting to note that, the same variable *Ability to analyse information* continue to be insignificant even when all three social-demographic variables were combined and introduced in the model (column 5 of Table 27). This combination of variables does not change the conclusion one might draw about the relationship between capabilities and satisfaction. To note, all three control variables (gender, age, and education level) were insignificant, even at 10% level. Thus, to this point, it can be said that the findings and analysis indicate degree of robustness in the relationship between satisfaction with informational capabilities and capability indicators.

In his framework, Sen (1985a) incorporated measures of individual differences to allow for

Table 27: Regression of satisfaction with informational capabilities, with gender, age and education level controls

Variable/Indicator	Capability			Capabilities and Gender and Age			Capabilities and Education			Capabilities and Gender, Age and Education		
	Coeff.	Std. error	Sign. Value	Coeff.	Std. error	Sign. value	Coeff.	Std. error	Sign. Value	Coeff.	Std. error	Sign. value
Access purpose	-0.437	0.141	0.002	-0.421	0.147	0.004	-0.421	0.142	0.003	-0.396	0.149	0.008
Ability to analyze information	0.400	0.204	0.050	0.437	0.206	0.034	0.382	0.205	0.064	0.415	0.207	0.055
Use information to negotiate on price	0.596	0.164	0.000	0.581	0.166	0.001	0.591	0.164	0.000	0.573	0.167	0.001
Enhanced ability to evaluate the quality of information	-0.598	0.210	0.005	-0.529	0.215	0.014	-0.630	0.214	0.003	-0.564	0.217	0.010
Enhanced Internet knowledge and skills	1.841	0.332	0.000	1.657	0.351	0.000	1.851	0.333	0.000	1.656	0.351	0.000
Confidence enhancement	-1.957	0.343	0.000	-1.851	0.350	0.000	-1.953	0.343	0.000	-1.836	0.350	0.000
Sell produce to different buyers	0.504	0.221	0.023	0.524	0.221	0.018	0.541	0.226	0.017	0.570	0.226	0.012
Impression for better price	-0.771	0.204	0.000	-0.867	0.210	0.000	-0.757	0.205	0.000	-0.856	0.210	0.000
Improved negotiating skills	0.734	0.198	0.000	0.831	0.205	0.000	0.708	0.201	0.000	0.805	0.206	0.000
Improved communication	-0.298	0.098	0.002	-0.333	0.100	0.001	-0.312	0.099	0.002	-0.351	0.102	0.001
Knowledge sharing	0.745	0.177	0.000	0.760	0.178	0.000	0.745	0.177	0.000	0.759	0.178	0.000
Increased income	-0.495	0.186	0.008	-0.460	0.188	0.015	-0.499	0.187	0.008	-0.464	0.188	0.014
More investment in agricultural production	0.347	0.181	0.045	0.349	0.181	0.041	0.364	0.182	0.046	0.372	0.183	0.043
Gender				0.194	0.127	0.128				0.211	0.128	0.101
Age				-0.097	0.066	0.145				-0.099	0.066	0.137
Age^2				0.001	0.001	0.161				0.002	0.001	0.151
Education							-0.020	0.025	0.421	-0.025	0.025	0.316
Observations	355			355			355			355		
R Square	0.525			0.530			0.526			0.532		
Adjusted *R* Squared	0.507			0.508			0.507			0.508		
Log likelihood	-370.02			-365.03			-369.6			-364.2		

Key: *Coeff. – Coefficient, Std. error – Standard error, Sign. value – Significant value*

different personal production functions. One method of achieving this is through the use of person-specific effects, and with this, Ferrer-i-Carbonell and Frijters (2004) suggested for a need of more information on the aspects of persons that influence life satisfaction. With this, Anand *et al.* (2009) proposed analyses that break down the data by subpopulations. Thus, Table 28 and Table 29 present the analyses of the model in Table 26 estimated for two sets of population subsamples. Table 28 presents results for a breakdown of respondents by gender, whilst Table 29 summarizes a similar analysis for respondents below and above 29 years of age - the approximate mean age for the overall sample. The groupings based on sex and age may give us a heterogeneous picture of the differences between the sub-groups. Some differences are expected as sub-groupings reduce the data sample size of each regression.

With Table 28, gender roles are not clearly depicted in the results. The three (3) indicators enhanced ability to evaluate the quality of information, impression for better price and improved negotiating skills have significant coefficients for women and not for men. The enhanced ability to evaluate the quality of agricultural market information for women, gives them the ability to negotiate better on the prices of their agricultural products. The overall, to women, is the impression that they get better prices for their agricultural products. These may suggest that women are more serious when the issue of marketing of agricultural products of their families comes. Also, three (3) indicators: use information to negotiate on price, ability to analyze information, and improved communication are significant to men. Use of information to negotiate on the prices of farm produce by men and their improved ability to analyse such information has effects on their agricultural marketing activities. Among the effects to men is the improved communication of agricultural marketing information. Unfortunately, there are no similarities in indicators for both men and women. Lack of similarity can be explained by a low percentage (i.e. 36.2%) of the dependent variable for men, which is explained by the independent variables, as compared to 67.1% for women which is explained by the independent variables.

Table 29 gives another attempt to explore more on the sample by breaking it based on age. The findings show that those aged 29 years and below are satisfied with their improved communication and knowledge sharing while those above 29 years are satisfied with impression for better price and increased income from sales of agricultural produce. As for the case of gender, there is no similarity in indicators for both age groups though more than half (50%) of the dependent variable are explained by the independent variables in each case

Table 28: Model estimation for subsamples by gender

Variable/Indicator	Female				Male			
	OLS	Standard error	*P* value	Ordered Logit *p* value	OLS	Standard error	*P* value	Ordered Logit *p* value
Access purpose	-0.018	0.236	0.938	0.029	-2.313	0.679	0.001	0.070
Ability to analyze information	0.253	0.374	0.500	0.470	1.093	0.454	0.017	0.020
Use information to negotiate on price	0.447	0.258	0.086	0.000	1.408	0.411	0.001	0.003
Enhanced ability to evaluate the quality of information	-0.612	0.285	0.034	0.024	-0.278	0.474	0.559	0.570
Enhanced Internet knowledge and skills	-0.345	0.543	0.526	0.000	1.731	0.584	0.003	0.972
Confidence enhancement	0.116	0.557	0.835	0.000	-2.145	0.534	0.000	0.971
Sell produce to different buyers	0.262	0.360	0.467	0.103	0.320	0.522	0.541	0.260
Impression for better price	-0.961	0.236	0.000	0.000	-0.705	0.379	0.064	0.060
Improved negotiating skills	0.815	0.257	0.002	0.001	0.971	0.442	0.029	0.080
Improved communication	-0.322	0.485	0.508	0.028	-0.338	0.125	0.008	0.009
Knowledge sharing	0.451	0.455	0.323	0.000	0.728	0.387	0.061	0.004
Increased income	-0.444	0.381	0.246	0.222	-0.569	0.347	0.102	0.189
More investment in agricultural production	0.942	0.322	0.004	0.186	0.572	0.384	0.138	0.651
Age	-0.331	0.115	0.005	0.028	-0.109	0.099	0.274	0.665
Age^2	0.005	0.002	0.005	0.030	0.002	0.002	0.303	0.699
Education	0.085	0.034	0.015	0.759	-0.029	0.035	0.411	0.139
Observations	126				229			
R-squared	0.671				0.362			
Adjusted *R*-squared	0.623				0.314			
Log likelihood	-98.168				-241.69			

(group). Lack of similarity can be attributed to the low age range (i.e. 18 – 49 years) resulting from involving more youths in the study. To summarize, when interpreting data and discussing results, a number of analyses are required in reaching the conclusion. Based on the analyses, comments and even recommendations can be drawn to facilitate the findings and discussion of the results. Nevertheless, this study has a number of comments. Firstly, this study has focused on the significance of coefficients and the *R*-squared values which determine the values of dependent variable explained by independent variables. Some researchers have commented on the good values for *R*-square. In general, the higher the *R*-squared value, the better the model that fits the data. But care should be taken as *R*-squared value does not indicate whether a model is adequate. You can have low *R*-squared value for a good model, or a high *R*-squared value for a model that does not fit the data. Sometimes, low values for *R*-squared are desirable. Fields, such as psychology, which attempt to predict human behaviour have lower *R*-squared values than 50%. Some items in Table 19 are reflected in works related to psychology and thus can partly constitute to satisfaction.

The second comment is about how capability (i.e. informational) can lead to satisfaction and ultimately to happiness. The list of items (indicators) in Table 18, Table 19 and Table 20 has been statistically trimmed down to thirteen (13) items. Upon introduction of control variables (gender, age, education), the thirteen items have significant coefficients. Though, some items in the subsamples in the population were statistically not significant. Both the initial and final lists contain items from different domains and thus we can consider satisfaction as a multi-dimension concept. To build the informational capability of an individual, different sectors are involved. We have seen how the introduction of the control variable education in the second model changed an item to be insignificant. It is important that individual farmers invest more in education in order to build and enhance their informational capabilities.

Thirdly and lastly, breaking the sample into subsamples allows for deeper exploration and analysis. This study has attempted to break the sample based on gender and age, though other options are available. Settings can be done to break the sample based on education level, income and even based on main economic activities. In all these sub-sampling, the target should be to allow further analysis and investigation to come out with finer results and conclusion.

6.6. Conclusion

To summarize briefly, this chapter was motivated by a dearth of detailed information about

Table 29: Model estimation for subsamples by age group

Variable/Indicator	Aged 29 years and below				Aged above 29 years			
	OLS	Standard error	*P* value	Ordered Logit *p* value	OLS	Standard error	*P* value	Ordered Logit *p* value
Access purpose	-0.296	0.258	0.253	0.175	-1.333	0.410	0.001	0.923
Ability to analyze information	0.528	0.315	0.095	0.025	0.756	0.501	0.134	0.012
Use information to negotiate on price	0.321	0.228	0.161	0.164	1.360	0.341	0.000	0.382
Enhanced ability to evaluate the quality of information	-0.809	0.364	0.027	0.099	0.611	0.598	0.309	0.104
Enhanced Internet knowledge and skills	1.345	0.975	0.169	0.124	1.169	0.650	0.075	0.983
Confidence enhancement	-1.265	1.030	0.221	0.096	-4.407	1.087	0.000	0.987
Sell produce to different buyers	0.434	0.339	0.201	0.211	3.401	1.310	0.011	0.315
Impression for better price	-0.343	0.350	0.328	0.125	-1.069	0.421	0.012	0.041
Improved negotiating skills	0.621	0.322	0.055	0.002	1.003	0.401	0.014	0.067
Improved communication	-0.396	0.129	0.002	0.006	-0.280	0.176	0.114	0.992
Knowledge sharing	0.531	0.256	0.039	0.009	0.516	0.545	0.346	0.986
Increased income	-0.502	0.299	0.095	0.039	-0.930	0.357	0.010	0.012
More investment in agricultural production	0.432	0.239	0.072	0.021	0.067	0.397	0.867	0.689
Age	0.147	0.357	0.682	0.634	-0.572	0.354	0.109	0.002
Age^2	-0.003	0.007	0.695	0.663	0.008	0.005	0.106	0.002
Education	-0.095	0.034	0.006	0.001	0.095	0.039	0.017	0.286
Observations	213				142			
R-squared	0.537				0.618			
Adjusted *R*-squared	0.499				0.569			
Log likelihood	-220.61				-115.40			

informational capabilities of small-scale farmers combined with need for such information that are relevant in agricultural marketing activities of their farm produce. Based on the definition of informational capabilities, and related concepts and theories, a survey instrument was constructed that provides indicators of informational capabilities across the identified dimensions. The questions developed provide an illustration of the social, informational, psychological, and economic statistics that the capability approach requires for its operationalization with quantitative empirical work. For the purpose of this chapter, resulting data on capability indicators were analysed based on the dependent variable which asked the satisfaction of respondents with their informational capabilities in accessing and delivering services. A shorter list of capability indicators was developed using the backward elimination, for which there is strongest evidence of a statistical link to satisfaction with informational capabilities. Further analysis suggested that the relations were reasonably robust with respect to the addition of socio-demographic variables. The big picture we obtain is that satisfaction of farmers with information is highly multivariate with respect to capabilities. Thus, to build and improve informational capabilities of individual farmer, dimensions such as social, informational, psychological, and economic need to be looked at with an open eye.

As much works are yet to be done on the respect of measuring informational capabilities, issues can be tailored to specific focus. Capability indicators can be developed that require attention of policy-makers and governments as they are sorely responsible for the development of the agricultural sector at large. Also, researchers (i.e. capability researchers) are still tasked to work more on the best ways of generating capability indicators and of generalizing the techniques of measuring such capability indicators with respect to identified issues.

To conclude with, capabilities approach remain a useful approach to developing an individual's capacity and capability to carry on his/her undertakings. With this, informational capabilities require the development of different perspectives of an individual to be informational competent. The different perspectives take in different actors (e.g. governments, private sector, communities etc.) and the early identified dimensions. The overall, is to bring satisfaction to an individual by developing his/her informational capability. One should remember that there are gaps between the two (capability and satisfaction) and this study is an attempt to build bridges between such two sides.

CHAPTER SEVEN

GENERAL DISCUSSION, CONCLUSION AND RECOMMENDATIONS

7.1. Introduction

This study was about how technology, specifically ICTs, can link rural farmer to markets for their farm produce. The study was motivated by the poor access to markets by small-scale farmers for their farm produce. Such poor access to markets results into failure of farmers to understand market variables like price, produce demand, buyers and traders, low bargaining power by farmers, and introduction of middlemen. The consequences of all these are low gains and incomes to farmers, and the underdeveloped agricultural sector. With this, linking farmers to markets means developing their capabilities to ensure they are competent in the agricultural marketing activities and become active market participants.

In the course of this study, a thorough analysis of agricultural marketing issues in developing countries has been done through a literature review; challenges that rural farmers experience were explicitly studied and analysed; based on the concept of capability approach, a framework for linking farmers to markets was developed; and informational capability of rural farmers were analysed and measured using a technique for measuring life satisfaction. In the following sections, the research will summarize the findings, conclude the research and recommend issues which are of interest for further research consideration.

7.2. Summary

Access and use agricultural market information has proved to be very useful to the development of agricultural sector. Providing agricultural marketing information enables farmers to make better selling decision, by-pass middlemen and intermediaries, creates transparency in agricultural marketing chain, and helps stakeholders to avoid the problems of asymmetric information. The essence is to ensure stakeholders in agricultural marketing all benefit and no one is exploited. This access and use of agricultural market information enable farmers to plan what to grow, when to plant and where to sell their farm produce. Also, better access to markets may encourage farmers to adopt modern farming practices. To all stakeholders, access to agricultural market information opens doors to national, export and international markets.

Efforts to establish communication infrastructures and thus diffusion of information, in African developing countries are promising and progressing well. This progress is contributed by the on-going extension of ICTs to rural areas and improving rural infrastructure like constructing roads and providing electricity in rural areas. Some mobile companies are now operating in rural areas as it can be noticed with their mobile money transfer services. In Tanzania, the government is extending the Internet backbone to rural areas, connecting villages to electrical power through the 'Rural Electrification Project' and encouraging rural people to install solar power. To do away with literacy, the government in collaboration with villagers (local communities) has constructed secondary school to almost every ward in Tanzania. These promising developments, establish flourishing environment for use of ICTs in information diffusion including agricultural market information.

Through analysis and using the capability approach, challenges that rural farmers encounter in accessing markets and marketing information were mapped onto the corresponding resources while developing the framework of linking rural farmers to markets. The framework also comprised of agency (i.e. resources to be possessed by smallholder farmers) and structure (i.e. environment in which the agricultural marketing activities are conducted) that work to empower smallholder farmers in agricultural markets to achieve development outcomes. The framework suggests that linking farmers to markets is multi-dimensional and multi-sectorial requiring involvement of different sectors.

The measurement of informational capabilities of rural farmers was conducted as a case study using an identified AMIS program NINAYO. Based on the economic, informational, social and psychological dimensions, the capability indicators to measure informational capabilities were developed and a survey instrument to measure such informational capabilities was administered to respondents who have accessed and used such an AMIS program. Analysis of results and findings trimmed down the capability indicators to shorter list which is statistically linked to satisfaction, of farmers on information access and delivery, with capabilities. Further analysis of such a short list with socio-demographic variables confirmed its robustness.

But why consider ICTs as a technology for delivering agricultural market information to rural farmers? Sometimes, information can be valued according to its immediacy, and thus information may have version. Current information is charged more, and delayed information may not be useful. Diffusion of information to end users is very important and Shapiro and

Varian (2013) noted “Infrastructure is to information as a bottle is to wine: the technology is the packaging that allows the information to be delivered to end consumers”. Thus, with use of ICTs to access information, one can realize immediacy and can access current information. Also, the ICTs allow users to access information any-time, and anywhere as long as that information is available and made accessible.

This research has also considered publication as a means of sharing information with other scholars and interested communities. By the completion of this study, two publications were produced as summarized below:

Magesa, M. M., Michael, K. and Ko, J., (2014b), Agricultural Market Information Services in Developing Countries: A Review. *Advances in Computer Science: an International Journal,* **3 (**3), 38-47.

This publication reviewed the literatures on agricultural market information services in African developing countries context. It is revealed that initiatives are there to establish such a service and that most AMIS that are in place were initiated with donor support. AMIS initiated with donor support have continued to received funding and thus become dependants years after their establishment and this raises the question of sustainability after donor withdraw. Farmers in these developing countries depend on middlemen and intermediaries in getting agricultural market information and use of traditional media in accessing agricultural market information. Some AMISs are considered to be successful but their impact is yet to be reported. These AMISs also lack a clear business model that can ensure sustainability after their implementation.

Magesa, M. M., Michael, K. and Ko, J., (2014a), Access to Agricultural Market Information by Rural Farmers in Tanzania. *International Journal of Information and Communication Technology Research,* **4 (** 7), 264-273.

This publication studied access and use of agricultural market information among farmers in three (3) districts in rural Tanzania. The study reveals use of traditional media such as word of mouth, village meeting, market visits and radio as prevalent in accessing agricultural market information and other information among the rural farmers. The study also noticed the mobile phone ownership increase among rural farmers. Farmers in the indentified districts can sell their agricultural produce at their homes, at traditional markets or at the identified markets. Access to markets and market information in these areas is constrained by human factors, physical assets, social

assets, natural assets and financial assets.

7.3. Contributions of the Study

This study was based in the ICT4D arena and it has employed different methodologies in its accomplishment. The study has greatly contributed in the existing body of literatures in ICT4D by linking ICTs with agricultural marketing, and capability approach. In the discipline of ICT4D, this research has contributed to its body of knowledge and understanding in the following ways:

(i) A thorough analysis of the status of agricultural market information services in African developing countries through an extensive literature review. The review has depicted clearly the status of agricultural market information, challenges, constraining factors and the promises. The first publication details the current AMIS in developing countries, comprehensively reviewed their status and presented the missing links to sustaining provision of agricultural market information. It is clear that Governments of developing countries and even development agencies are promoting the use of technologies in delivering services. We currently notice movements from paper based work to paperless in different sectors in developing countries. Examples include use of ATM cards to withdraw money, use of mobile money transfers, and record keeping (in hospitals, schools, banks etc.). Thus, this study acts as a basis that can be adopted by other scholars while researching on the use of technology for service provision.

(ii) A description of market access, knowledge of ICT among rural farmers and challenges in accessing agricultural market information. The second publication of this study details factors hindering market access by rural farmers, and presents the status of ICT knowledge among rural farmer. The publication also gives a comprehensive list of factors constraining access and use of agricultural market information among rural farmers.

(iii) Developing a framework for linking rural farmers to markets and marketing information based on the capability approach. Literature on how to link capabilities with ICTs is extensively made, and different existing frameworks were also studied. Literature on information capabilities was also provided while measuring the information capabilities of rural farmers.

(iv) Lastly, this is among the few studies which contribute to literature on measuring

informational capabilities.

7.4. Conclusion

Access to markets and market information for agricultural products by rural farmers is anticipated with many benefits including increased incomes and giving farmers the voice. These benefits are motives for farmers to invest more in agriculture and possible adoption of modern farming practises. More incomes from agriculture can attract more investments, provide employments to many, and contribute more to national economy.

There is good promising environment for the adoption of ICTs in rural areas. Extending communication infrastructure to rural areas and powering the rural areas through government initiatives are among the strategies of ensuring rural citizens can utilize ICTs in accessing and using the services. Educating its citizens through the secondary schools established countrywide, is among the strategies of improving literacy rate which in turn improves their informational capability. Citizens have also understood the importance of investing in education and thus are collaborating in constructing and developing schools in rural areas, and encouraging their children to join schools. Construction of rural roads connecting to main roads and towns may also accelerate access to markets by rural farmers.

Among the issues that need to be considered in providing farmers with access to agricultural market information is its sustainability. As early hinted, most AMIS and programs fail after the withdraw of donors and supporters. Thus, establishment of AMIS should carefully be designed to ensure its sustainability for long-run. One can consider issues of charging for the services provided by AMIS. These charges may be charged per request or per month or per annual. A farmer with a well-developed informational capability will consider information to be an important asset to his/her agricultural dealings.

Another strategy of improving the marketing skills of small-scale farmers is through providing training, targeting specific farmers. These training will improve and strengthen farmers' marketing skills and help to link them to other actors and marketing chain of agricultural products. These training will help farmers to develop their entrepreneur skills and become business oriented, and thus consider their farm produce as commodities. A farmer with good marketing skills will basically use the market information while selling his/her farm produce.

Another strategy of linking farmers to markets is through the establishment of farmers' group, association and also encourages them to join cooperatives. Through the groups, members come together to share market knowledge, sell together their farm produce and develop business opportunities. Through the groups, access to markets and market information will be easy and also it will enable collective selling of farm produce. The groups enhance bulk marketing of produce by members in order to reduce transaction costs and enhance economies of scale. These groups will become active marketing actors; they will go out and exploit the market, rather than waiting the markets exploit them. Through these groups, trainings can be organized such as production methods, negotiation skills, grading and sorting of products.

In developing countries, like Tanzania, success of the programs also depends on the vision and mission of the governments. These countries are working to develop their economies and thus some sectors may be of priority. Financially, programs within the priority sectors benefit more and thus are likely to be developed. Thus, the development of the agricultural sector will also depend on the economies of the country, and the vision and mission.

Lastly, ICTs is meant to empower and individual to access, analyse and utilize information. Use and hence appreciation of such information will depend on the "*mentality*" of that individual. Thus, though use of ICTs in agricultural marketing is being advocated by many, the use and success of the initiatives still depend on the good will of the information recipients i.e. small-scale farmers.

7.5. Recommendations and Future Works

Use of ICTs in accessing information is among the factors that enhance an individual's or group's capacity to make effective choices and translate these choices into desired actions and outcomes (Hamel, 2010). This access also impacts on people's sense of empowerment and develop their abilities to be active participants in their societies (Brown and Green, 2012; Kleine, 2010). Norris (2001) advocated that ICT can enhance the empowerment of civil society by augmenting their capacity to work as organized networks both within and beyond borders. ICT has been very useful in delivering services as can be seen in the health and education sectors. Despite its importance, some barriers are hindering ICT adoption and use in rural areas of developing countries. These barriers include lack of connectivity and electricity in rural areas, poverty and thus failure to own technology and meet communication costs, illiteracy in operating ICT equipment, lack of skilled trainers and training centres in

rural areas, social and cultural factors discouraging use of technologies, lack of awareness on the benefits embedded in technology, and poor support from the Governments (Kapurubandara and Lawson, 2006; Khan *et al.*, 2012; Lawrence and Tar, 2010). These barrier factors are also affecting access of agricultural market information in rural areas.

To work on the barriers for improving access to ICT in rural areas, different stakeholders need to be involved. Stakeholders that can participate in this process include governments, service providers, private sectors, development partners and agencies, and the rural citizens themselves. Based on these, the following recommendations are made to ensure rural citizens reach the markets and use ICTs in accessing information including agricultural market information:

(i) Service providers (i.e. ICT services) can be encouraged to extend connectivity and communication services to rural areas. Services include providing Internet connectivity, mobile communications, and TV broadcasts. Initiatives such as establishment of tele-centres in rural areas, offering various ICT services such as radio broadcasting, Internet, telephone, computer and secretarial services to the rural poor are appropriate.
(ii) Rural citizens be encouraged to use ICT and create awareness among them. This may involve creating awareness and promotion of the use of ICT, providing training on ICT related matters and introducing ICT usage in delivering services.
(iii) Governments invest in training rural citizens in ICTs. Such training may be introduced to primary or secondary schools or be provided directly to identified local citizens. This program will ensure more citizens are trained in ICTs and thus awareness creation and promotion become easy.
(iv) Involving local people in creating their local contents relevant to them. Local people may have feeling of ownership and thus value such information.
(v) Also, lowering tariffs and taxes for providing ICT services in rural areas may encourage investment in and provision of ICT services in rural areas.

Another important issue to address after accessing agricultural market information is the physical access to markets. Good roads will ensure availability of transports and lowers the associated transport costs. Also, market infrastructure like storage facilities is important to ensure received farm produce are stored safely during and after their sale.

Both the findings of this research and its limitations help to identify potential future research

directions for more investigation. Among the recommendations for further research as a result of this study are listed below:

(i) More researches can be carried to further validate the findings, so as to increase the generalization of the study results in different areas within Tanzania. This can involve re-testing the research findings and recommendations in different regions in Tanzania (growing varieties of agricultural products) to determine whether the findings have the same impact;

(ii) The framework should be validated in different contexts (i.e. based on other resources) in order to extend its generalizability and contribution to the livelihood of small-scale famers in rural areas;

(iii) Rural areas in some African developing countries share the same characteristics and thus comparative studies can be conducted in other East African countries to determine differences in the context of developing countries; and

(iv) A thorough study on sustainability of ICT projects providing agricultural market information to small-scale farmers in developing countries to ensure success and continuity of the project even after the project completion period.

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APPENDICES

Appendix 1: Interview checklist questions

Questions

1. How long have you been in this village/place?
2. What is your main economic activity? Other activities?
3. Since when engaged in agricultural production?
4. What crops are you growing?
5. What is the purpose of growing such crops? Business? Food? Both?
6. Do you sell your agricultural produce? What is the purpose of selling your produce?
7. Where do you sell your produce? At the farm? Home? Markets? Where else? If it is at markets, which markets? Distance to markets? Means of transport?
8. How do you decide the market(s) to send your produce to?
9. How do you learn the price of the produce before/while selling?
10. Do you own a radio? TV? Mobile phone?
11. Do you know how to use a computer? Internet?
12. How do you access agricultural market information (e.g. price of produce you want to sell)? TV or radio broadcasts? Internet?
13. Do you sell your produce at the foreseen price? Explain.
14. Do you feel to benefit/loose after selling your produce? Why?
15. What factors constrain you in accessing markets for your farm produce? Explain.
16. What are your expectations in (a) agricultural marketing and (b) in agriculture in general?

Appendix 2: Questionnaire - Access to Markets and Use of Agricultural Market Information

This questionnaire intends to collect information from smallholder farmers who are accessing markets and using market information for their farm produce during their agricultural marketing activities. The intention is to learn how smallholders access markets and use market information, constrains hindering them in accessing markets and how the current technologies of ICT can be of benefit to the rural farmers.

INSTRUCTION: Fill in the blank spaces by writing the correct answer/word pertaining to the statement OR by placing a tick (✓) in the Square Brackets with the answer/word that best fits the statement/question (*based on your experience*).

1. Personal Information: First Name: _____ Surname: _____ *(Optional)*
   Sex: Male [ ] Female [ ] Age: _____ Years
   Residence: Village: Ward: District:
   Contacts: Mobile Phone No: _____ Email: _____ *(Optional)*
2. Level of Education: Did not complete Standard Seven [ ] Standard Seven [ ]
   Form Four: [ ] Form Six [ ] University Degree [ ]
3. Economic Activity: Agriculture [ ] Business [ ] Employment [ ]
   Other economic activities: _____
4. Estimated income per month (Tshs) < 50,000 [ ] < 100,000 [ ]
   < 200,000 [ ] < 300,000 [ ] < 400,000 [ ] > 400,000 [ ]
5. Crops Grown: Maize [ ] Rice [ ] Bananas [ ]
   Others: _____
6. Main crop: _____ Size of the farm: _____
7. Purpose of growing main crop: Food [ ] Business [ ]
   Others: _____
8. Are you a member of any farmers' organization Yes [ ] No [ ]
   If *yes*, mention it: _____
9. Which media do you use to get and/or providing information? Radio [ ]
   Mobile phones [ ] Newspaper [ ] Television [ ]
   Others, mention: _____
10. Which of the following media do you use to get and/or provide agricultural market information? Radio [ ] Newspaper [ ] Magazine [ ]
    Television [ ] Mobile phone [ ]
    Others, mention: _____ _____ _____

11. Which of the following limit you from accessing information by using the media in 10 above?

Lack of electricity [ ] Poor roads [ ] Services not available [ ]

Timing of broadcasting [ ] Costs, too expensive [ ]

Others, mention: _____

12. Do you know how to use computers? Yes [ ] A little [ ] No [ ]

13. Do you know how to use the Internet? Yes [ ] No [ ]

If you answered YES, how/where do you access the Internet?

Using my mobile phone [ ] My home computer [ ] Internet cafe [ ]

Where else? _____

14. What are the reasons for selling your produce? To cater needs [ ] Business [ ]

Others, mention: _____

15. Where do you sell your produce? Farm [ ] Markets [ ] Home [ ]

16. Which markets do you send your produce for sale?

	Market	Estimated distance to market (Km)
i)		
ii)		
iii)		

17. How do you get buyers while selling your farm produce?

Inform friends, neighbours etc. [ ] Inform agents/intermediaries [ ]

Send produce to markets [ ] Inform traders [ ]

Others, mention: _____

18. What kind of market information do you prefer to find and access?

Price [ ] Transport costs [ ] Demand of produce [ ]

Buyers and traders [ ] More demanded produce [ ] Road condition to markets [ ]

Others, mention: _____

19. How do information on availability of markets and price help you?

Get fair price for produce [ ] Decide when to send produce to market [ ]

Establish link with traders [ ] Decide which market to send produce [ ]

Plan what crops to plant next season [ ]

Others, specify: _____

20. How do you get market information such as price of produce, demand and deficit of produce at markets?

From friends, neighbours	[ ]	Listening the radio	[ ]
Watching television	[ ]	From extension officers	[ ]
Newspapers, magazines	[ ]	Mobile phone calling	[ ]
From traders and their agents	[ ]	From our farmers' group	[ ]
Visiting the markets	[ ]		

Others, mention: _____ _____

21. What are the barriers of getting market information such as price at your area?

i) _____ iii) _____

ii) _____ iv) _____

22. What agricultural information would you prefer to be available to your local community?

Price information	[ ]	Agricultural policy	[ ]
Agricultural inputs such as seed, and fertilizer	[ ]	Climate information	[ ]
Availability of markets for local community produce	[ ]		

Others, mention: _____ _____ _____

23 Mention your expectations in agricultural marketing and in agriculture in general:

i) _____ iii) _____

ii) _____ iv) _____

-- THE END-

Date: …./…./2017

Appendix 3: Questionnaire for Measuring Informational Capabilities

This questionnaire intends to collect information from small scale farmers who are accessing different markets for selling their farm produce. Farmers targeted are those who have been accessing and using agricultural market information from a mentioned program 'NINAYO'. The purpose of collecting such information is to measure the Informational Capabilities of these small scale farmers who have been utilizing such information during the marketing and selling of their farm produce. Thus, the information that will be provided and collected will only be used for the mentioned purpose of this study and not otherwise.

INSTRUCTION: Fill in the blank spaces by writing the correct answer/word pertaining to the statement OR by placing a tick (✓) in the Square Brackets with the answer/word that best fits the statement/question (*based on your experience*).

1. Personal Information: First Name: _____ Surname: _____ *(Optional)*
   Sex: Male [ ] Female [ ] Age: Years
   Ward: _____ District: _____ Region: _____
   Your Contacts: Email: _____ Mobile Phone Number: _____ *(Optional)*
2. Your highest level of education: Standard Seven [ ] Form Four [ ]
   Form Six [ ] University Degree [ ]
3. Do you own a mobile phone? Yes [ ] No [ ]
   If *yes*, is it a smartphone? Yes [ ] No [ ]
4. Please rate your knowledge on using a computer: Best [ ] Better [ ]
   Good [ ] Poor [ ] Don't know [ ]
5. Please rate your knowledge on the Internet use: Best [ ] Better [ ]
   Good [ ] Poor [ ] Don't know [ ]
6. What is your main economic activity? Agriculture [ ] Business [ ]
   Employment [ ]
   Others, specify: _____ _____
7. What is the other economic activity you depend on? _____
8. What crops are you growing? Maize [ ] Rice [ ] Beans [ ] Bananas [ ]
   Others, mention: _____ _____
9. What are the purposes of growing crops? Food [ ] Business [ ]
   Others, specify: _____
10. How much do you harvest in a season? Less than 5 sacks [ ] Less than 10 sacks [ ]
    Less than 15 sacks [ ] Less than 20 sacks [ ] More than 20 sacks [ ]
11. Mention agricultural markets you normally visit when in need of selling your farm produce:

	Market	District	Region	Distance in Kms
a)	_____	_____	_____	_____

b)				
c)				
d)				

12. What transport do you use when sending farm produce to markets?

On foot [ ] Bicycle [ ] Motorcycle [ ] Car [ ]

13. How do you access agricultural market information (e.g. price for products, demand for a certain produce etc.) of your farm produce you want to sell?

Visiting markets	[ ]	Watching TVs	[ ]	Reading magazines	[ ]
Listening radios	[ ]	Talking to others	[ ]	Through the program 'NINAYO'	[ ]

INSTRUCTION: The following questions/statements are intended to learn your experience with the program '**NINAYO'** you have been using for sometimes in accessing agricultural market information. Kindly respond on each question/statement as per your understanding/feeling/experience of the program.

14. How long have you been using the program to access agricultural market information?

Less than a year [ ] Less than two years [ ]

Less than three years [ ] More than three years [ ]

15. Which ICT devices are you using to access agricultural market information from the program? Desktop Computer [ ] Laptop [ ] Mobile Phone [ ]

16. Were you able to upload into the program the agricultural market information of your farm produce you wanted to sell? Yes [ ] No [ ]

17. Were you able to find from the program the agricultural market information (e.g. price) of farm produce you wanted to sell? Yes [ ] No [ ]

18. When do you access/use the program? Any time I have credits [ ]

Every time I want to sell my farm produce [ ] Occasionally [ ]

INSTRUCTION: Please answer **Yes** or **NO** in each of the following statements:

19.	I access the program with the purpose of getting agricultural market information for the farm produce I want to sell.	Yes [ ] No [ ]
20.	I was able to get the agricultural market information I was searching in the program.	Yes [ ] No [ ]
21.	I can analyse and interpret the agricultural market information I get from the program.	Yes [ ] No [ ]
22.	I share with others the agricultural market information I get from the program.	Yes [ ] No [ ]
23.	I use the agricultural market information I get from the system to negotiate on the price of the produce I want to sell.	Yes [ ] No [ ]

INSTRUCTION: Please rate each of the following statements:

24. The program has enhanced my ability to find, locate and evaluate the quality of agricultural market information I am interested with.

		Strongly agree	[ ]	Agree	[ ]
Undecided	[ ]	Disagree	[ ]	Strongly disagree	[ ]

25. Generally the program has enhanced my knowledge and skills in searching, locating and using information in the Internet.

		Strongly agree	[ ]	Agree	[ ]
Undecided	[ ]	Disagree	[ ]	Strongly disagree	[ ]

INSTRUCTION: Please rate each of the following statements based on your experience of using such a program:

	Statement	**1**	**2**	**3**	**4**	**5**
26.	I am confident with the information (e.g. price) I have during the selling of my farm produce.	[ ]	[ ]	[ ]	[ ]	[ ]
27.	Now, I can sell my produce at different markets depending on the information I have.	[ ]	[ ]	[ ]	[ ]	[ ]
28.	Now, I can sell my produce to different buyers depending on the information I have.	[ ]	[ ]	[ ]	[ ]	[ ]
29.	I have the impression that the program has enabled me to receive better prices for my farm produce.	[ ]	[ ]	[ ]	[ ]	[ ]
30.	Generally, I feel that my price negotiating skills has improved.	[ ]	[ ]	[ ]	[ ]	[ ]

Key: *1- Strongly agree* *2 - Agree* *3 - Undecided*
4 - Disagree *5 - Strongly disagree*

INSTRUCTION: Please rate each of the following statements based on your experience of using such a program:

	Statement	**1**	**2**	**3**	**4**	**5**
31.	Based on the information I get from the program, I can decide whom to sell to, where to sell, and the time to sell my farm produce.	[ ]	[ ]	[ ]	[ ]	[ ]
32.	The program has enhanced my interaction with others for sharing entrepreneurial skills.	[ ]	[ ]	[ ]	[ ]	[ ]
33.	Generally, use of the program has empowered me in agricultural marketing issues.	[ ]	[ ]	[ ]	[ ]	[ ]
34.	The program has improved my ability to communicate with others on agricultural market information.	[ ]	[ ]	[ ]	[ ]	[ ]
35.	The program has improved my participation in community activities.	[ ]	[ ]	[ ]	[ ]	[ ]
36.	The program has enhanced my interaction with others for sharing experience.	[ ]	[ ]	[ ]	[ ]	[ ]

37.	The program has enhanced my interaction with others for sharing knowledge.	[ ]	[ ]	[ ]	[ ]	[ ]
38.	The program has transformed my sense of feeling of inclusion in the modern world of science and technology.	[ ]	[ ]	[ ]	[ ]	[ ]

Key: *1- Strongly agree* *2 - Agree* 3 - Undecided
4 - Disagree 5 - Strongly disagree

INSTRUCTION: Please rate each of the following statements based on your experience of using such a program:

	Statement	**1**	**2**	**3**	**4**	**5**
39.	At present I find it easy to market my farm produce when I want to sell.	[ ]	[ ]	[ ]	[ ]	[ ]
40.	The program has improved my ability to access different markets for my farm produce.	[ ]	[ ]	[ ]	[ ]	[ ]
41.	The program has lowered the transaction costs and hence increased my income from sales of farm products.	[ ]	[ ]	[ ]	[ ]	[ ]
42.	The program has reduced the transportation costs and hence increased my income from sales of farm products.	[ ]	[ ]	[ ]	[ ]	[ ]
43.	The program has increased the timeliness of sales and hence increased my income from sales of farm products.	[ ]	[ ]	[ ]	[ ]	[ ]
44.	The program has encouraged me to use ICTs in other areas in delivering services.	[ ]	[ ]	[ ]	[ ]	[ ]
45.	I find it appropriate to invest more in agricultural production as a result of the skills I have acquired through the program.	[ ]	[ ]	[ ]	[ ]	[ ]

Key: *1- Strongly agree* *2 - Agree* *3 - Undecided*
4 - Disagree *5 - Strongly disagree*

46. Please indicate how appropriate you find to invest more in agricultural production as a result of the skills you have acquired through the program.

Appropriate	[ ]	More appropriate	[ ]
Not appropriate	[ ]	Undecided	[ ]
Not appropriate at all	[ ]		

-- THE END ---