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The Influence of agricultural information on smallholder potato farmer's production: a case study of Nyandarua County.

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The Influence of Agricultural Information on Smallholder Potato Farmer's Production: A Case Study of Nyandarua County

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DECLARATION

I declare that this research is my original work and has not been previously submitted and approved by Strathmore University or any other Institution for the award of a degree. To the best of my knowledge and belief; this research is original and borrowed materials has been done with due reference.

Caroline Mbugua
June 2019

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ABSTRACT

There is a positive relationship between information and agricultural development which is an asset that the developed nations have capitalized on to occupy their coveted positions in food security because of information generation and delivery to their people. Assessing the flow of agricultural knowledge and information in the rural areas of Kenya, is therefore important. The main objective of the study was to establish the influence of agricultural information on potato production with special focus on smallholder potato farmers in Nyandarua County. Specific objectives were; to determine the sources agricultural information, types of agricultural information, factors influencing accessibility to information and how the accessed information was utilized. This study adopted a descriptive research design. Study target population was 101,697 smallholder potato farmers in Nyandarua County. The study sample size was 150 smallholder potato farmers. A structured questionnaire was used for data collection. The data was analyzed using the Statistical Package for Social Sciences (SPSS) version 23. Descriptive statistics including frequencies, means and standard deviation were applied to analyze numerical data gathered using closed ended questions. Regression analysis was used to determine the relationship between the study variables. The data was presented in form of tables, figures and pie charts. The study established that sources of information for farmers affect the uptake and perception of farmers in regards to their credibility. Factors like age, gender, literacy levels influenced access to information. The study concluded that, cost, budgetary constraints, farmers training of all kinds, infrastructure, and farmers' culture affected effective usage of agricultural information to a great extent. The study recommends that household heads be financed and trained to acquire skills on internet access and usage, especially through the use of smart phones and computers for the information obtained may help them improve their farming skills which will at the same time be transferred to their relatives, neighbors, other farmers and farm managers employed or involved in day to day farming activities.

KEYWORDS: Agricultural Information, smallholder farmer, extension agents

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LIST OF ACRONYMS

ADC - Agricultural Development Corporation

ASGTPs- Agricultural Sector Growth and Transformation Strategy

AIS- Agricultural Information Service

GDP- Gross Domestic Product

Certified Seed Potato (CSP)

MDGs -millennium development goals

MoA- Ministry of Agriculture

NACOSTI- National Commission for Science Technology and Innovation

NGOs- Non Governmental Organizations

PBC- Perceived behavior control

ICT- Information and Communication Technologies

SPSS -Statistical Package for Social Sciences

SDGs- Sustainable Development Goals

UNHS (Uganda National Household Survey)

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DEDICATION

This dissertation is dedicated to my family, who have been very supportive, full of encouragement and contributed to who I am today. I also thank the Almighty God for the gift of life.

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CHAPTER ONE: INTRODUCTION

1.1 Background to the Study

The agricultural sector is the backbone of many economies in Africa (Lwoga, 2014). Over the years, there has been a strong focus on development assistance on economic development and poverty reduction due to the UN Sustainable Development Goals (SDGs). The second Sustainable Development Goal (SDG 2) explicitly aims at ending hunger, achieving food security and improved nutrition, and promoting sustainable agriculture, simultaneously by 2030 (FAO, 2017). Agriculture is a vital development tool for achieving these SDGs. In the whole of Sub-Saharan Africa, agricultural production extensively relies on embracing agricultural intensification strategies by the farmers which involve but is not limited to investments in modern inputs and technologies. Obidike (2011) opined that new technologies have been found to enhance productivity which in the long run reduces poverty through raising of farming households income, creating more jobs and lowering food prices. Agricultural sector's production and productivity can be enhanced by increasing farmers' access to and effective utilization of agricultural information through identifying and working on the problems that affects the access to and utilization of agricultural information. Umeh & Chukwu (2015) added that generation of these agricultural research information can only be meaningful when they are accessed and utilized at the farm level.

The importance of agriculture to the development of a nation cannot be over emphasized. This is because the growth and development of a nation is closely linked to its ability to feed itself adequately without relying on import (Adebo and Ewuola, 2006).For agricultural development to occur, provision of agricultural information plays an important decisive role (Tadesse, 2008). Improved information and knowledge flow to, from, and within the agricultural sector is important in improving small-scale agricultural production, unfortunately, most African countries have not devoted their efforts towards achieving efficient dissemination of knowledge and information, especially in rural areas, where 70 to 80 percent of the African population lives (Adomi et al., 2003). Farmers in rural areas are faced with scarcity in accessing agricultural information, despite the large body of knowledge that is available in research institutions, universities, public offices

and libraries. This can be attributed to the weak linkages between research, extension, not for profit organizations, libraries and farmers and thus these information do not reach their intended beneficiaries to improve their farming activities in developing countries like Tanzania (Tire, 2006). Thus, it was imperative to assess the factors influencing accessibility of the agricultural information and knowledge in the rural areas of Kenya.

1.1.1 Agricultural Information.

Information is fundamental to our way of life and agriculture is no exception. Farmers require access to reliable information and knowledge along the value chain if their productivity is to improve (Aidoo et al., 2016). To enhance small-scale agricultural production and link increased production to profitable markets improving data and information flow to, from, and within the agricultural sector are a key. This will lead to to improved rural livelihoods, food security and national economies, improved quality and farmers yield, Asaba et al., (2006). Oladele (2011) conquered with this findings that knowledge and information are transformational tools for food security and rural development. The Green Revolution of Asia and the Near East was realized through good use of knowledge and information. Information is therefore an important tool for development that helps farmers to make effective farming decisions. In this study the researcher uses agricultural information to mean agricultural messages or impact messages that is embodied in agricultural information, innovations and transferred between the various actors in the agricultural system. According to Fawole (2008) there exist a positive relationship between increased flow of information and increased agricultural development.

Agricultural information is an important resource and has its use in rural, agricultural, social and industrial development (Nwachukwu et al., 2009). Some of the challenges encountered by farmers is the lack of timely, updated agricultural information, despite several research findings lying in shelves in many research organizations and government institution. The most useful asset a farmer can have to help with the management is accurate and timely agricultural information. In Tanzania Lwoga, (2014) study found there was a large information and knowledge gap such as control of plant diseases and

pests, marketing, credit and loan facilities, and control of animal diseases. Further, knowledge and information needs varied across communities and were location specific because of variations in development, agricultural activities and agro-ecological conditions in the surveyed communities. These findings concurred with other studies on agricultural information needs in Kenya and South Africa (Wafula-Kwake & Ocholla, 2007) and Tanzania (Matovelo et al., 2006).

Ronald et al. (2014) did a study to identify the major sources of information used by farmers in accessing agricultural information. The findings showed that were family or parents, personal experience, radio, neighbor, friends and agricultural extension officers were most used sources. Ijatuyi (2016) stated that information is a very important resource in ensuring there is economic development for any country. Further added that agriculture advances when the bridge between the farmers and the researchers is eliminated through efficiently and effectively communicating information to the farmers either through the farmers preferred source of or by direct dissemination from the extension officers to the farmers. For information to have a positive impact on agriculture it must be sufficient, timely, relevant, and easily accessible through appropriate sources. The perceived degree of credibility also varies, professional colleagues, newspapers were ranked as most credible and mobile phones, radio and professional colleagues were also found to be useful sources of information.

1.1.2 Information and Communication Technologies

Over the last years there has been a lot of advancements in the Information and Communication Technologies (ICTs) thus creating a leeway for developing nation to harness and optimally use information and knowledge to enhance their productivity in various sectors including agriculture (Lwoga & Ngulube, 2008). Despite the progress, resource poor farmers have been greatly affected by the digital divide which creates a gap between groups and individuals in their capacity to use ICTs effectively because of the difference in literacy technical skills (Ghatak, 2007). ICT can become a key enabler of the agricultural-food sector by making dynamic and real time global level exchange of data as stated by (Rao, 2007).

One of the challenges faced by farmers is poverty of information which prevents them from participating aggressively in markets critical as agriculture the world over has become more market oriented and competitive globally, the rural populations are not only resource poor but also information poor, Siraj (2012). Turning to the internet is also not always the best alternative because at currently it is considered expensive in Africa and the South when compared to average incomes. According to (Achugbue and Anie, 2011) information as an enterprise is significant in the production process especially in production and marketing of agricultural produce. Additionally in the current information age, dissemination of information and its application in the process of agricultural production play a significant role in the development of farming.

1.1.3 Potato Farmers Production

According to (World Resources Institute, 2014) potato (commonly referred to as Irish potato) is among the world's most underexploited, nutritious, and all-around food crops with more than 133 million tons in annual production. Globally, potato is amongst the top six most important food crops together with maize, cassava, wheat and rice. In Kenya a report by Ministry Of Agriculture, Livestock and Fisheries, (The National Potato Strategy 2016-2020) shows that potato sub sector is an important industry with potato being the second most important food crop in Kenya after maize. Approximately 2-3 million tons of potatoes worth roughly Ksh. 40-50 billion are produced each year and engaging millions of Kenyans. Maize on the other hand has an annual production of about 40 million bags worth Ksh. 120 billion. The industry is characterized by many small scale farmers and a few large scale farmers and scattered in several counties. Potato is traded in unstructured marketing systems where value addition is minimal at producer level despite the huge potential. In Kenya potatoes have a high potential for addressing food insecurity, unemployment and low farm incomes due to its versatility in utilization and high productivity per unit area. The high yield potential compared to other crops makes it a good crop especially in Kenya where land is scarce leading to fragmentation of

farms hence many small scale producers comprising of about 80% of agricultural producers.

Potato production is expected to grow and even has the potential to take the number one spot as food crops like maize have over the years been adversely affected by climate change (German Federal Ministry for Economic Cooperation and Development , 2014). In Kenya, potato production is low compared to other countries, this is attributed to the constraints threatening subsistence farms. The low potato yield is attributed to pests and diseases, especially bacterial wilt, late blight, viruses, inadequate supply and inability of farmer access to quality inputs (Ojaghian et al., 2012). The average production is estimated at 7 to 10 MT per hectare compared to a global average yield of 17 MT per hectare (FAOSTAT, 2014). Less than 0.05% of potato growers in the country have more than 25 ha of land (Janssens et al., 2013). Potatoes are an increasingly important source of cash for low-income smallholder farmers and because it is a highly labor intensive crop, it generates a lot of employment estimated at approximately 2.5 million people employed in the subsector's production, processing and marketing (FAO, 2013).

According to (Agricultural Sector Growth and Transformation Strategy, 2019-2029) agricultural transformation is critical in growing the economy consequently reducing the cost of food, alleviating poverty and delivering 100 percent food and nutrition security. Every Kenyan resident should have access to affordable and nutritious food. Over 18 million Kenyans earn income from agriculture. The country's economic growth therefore depends on enabling these people to achieve food and nutrition security, and contribute more fully to the economy. The sector contributes approximately 26% of the country's Gross Domestic Product (GDP) and has provided employment for about 75% of the population; the sector is a major source of revenue with agricultural produce exports accounting for nearly two thirds of total domestic export (Ministry of Agriculture, Livestock and Fisheries, 2015). In addition, smallholder farmers need added information if they are to gain access to formal markets and take advantage of opportunities presented by modernization. For Kenya's economy agriculture provides a source of livelihood for majority of the rural population. Nearly all of Kenya's potatoes are sold in the domestic

market and consumed locally thus imports and exports are negligible. Kenyan potatoes are greatly in demand by urban residents and this demand is increasing further due to preference for French fries (chips) and crisps as a result of changing dietary habits and lifestyles (Janssens et al., 2013). In the long-run, increase in potato supply may reduce inflation and lower cost of living (Leeuwis, & Struik, 2009).

1.2 Problem Statement

Potato production has failed to meet the demand in the country in spite of the potentials farmers have in doing so and this has adversely affected the demand and supply balance in the domestic market. It has also raised a great concern among all stakeholders involved in the potato production. Achieving sustainable agricultural development is not only based on material inputs (such as seeds and fertilizer) but on the institutions and people involved (FAO, 2012). Availability of adequate information on production techniques and the application of technologies are crucial in improving the production and productivity of potatoes in Kenya. This is because information and technology is an important input in agricultural development. Adejo et al,. (2013) opined that access to information is important if agricultural production especially in rural areas is to improve especially because in the rural areas agriculture is the main source of livelihood.

According to (Agricultural Sector Growth and Transformation Strategy ,2019-2022) report despite Kenya's impressive advances across the economy, in innovation and entrepreneurship, private sector enterprise, infrastructure, public service delivery and human capabilities, agriculture continues to be the bedrock of the development of our nation and the key to creating equitable and sustainable growth for our people. No large country has ever achieved significant growth without modernizing its agricultural sector. In addition to driving our economic growth, agriculture also creates jobs for our rural communities and is essential to satisfying the nutritional needs of all our people. The importance of agriculture has been emphasized in Kenya through Vision 2030, the Medium-term Plan III, and most recently the President's Big Four priority agenda for 2017-2022, which emphasizes the importance of 100% food and nutrition security for all Kenyans (Agricultural Sector Growth and Transformation Strategy, 2019-2022).

From the foregoing, it is evident that information is a vital tool for achieving agricultural development. This is evidenced by the fact that some of the most developed nations of the world occupy their coveted positions in food security because of information generation and delivery to their people, Sani et al., (2014). It is therefore equally desirable for African governments and the Kenyan government in this case, to intensify their efforts in the provision, dissemination and use of agricultural information by the farmers at all levels in order to achieve self-sufficiency in food and grow the GDP of their countries. Opara (2008) noted that in agricultural information lies potential which can significantly boost agricultural production and create huge impact on researchers, policy makers, and the farmers in Africa including those in Kenya.

The rapid growth of agricultural information offers an opportunity to increase the economic benefits to farmers and the economy in general and in Kenya as well. Exploiting this opportunity demands effective diffusion of the information and technology within the agricultural sector. A number of studies have been conducted in other countries. Example is in Tanzania a study was conducted on access and use of agricultural information by Lwoga et al., (2011). In Nigeria some studies in the area include the study of Rural Farmers' Problems Accessing Agricultural Information, Obedike (2011), access and use of agricultural information resources by rural women of Akure North and South Local Government areas of Ondo State Nigeria study by Oyeniyi& Olofinsawe (2015). As a result, the factors that influence information dissemination amongst smallholder potato farmers in Kenya are not clear and need to be investigated hence the motivation for this study. Technology has the potential to communicate farm information to a large number of farmers simultaneously and quickly. Thus, it was imperative to assess the factors influencing accessibility of the agricultural information and knowledge in the rural areas of Kenya. It is in view of the above that the researcher explored the influence of agricultural information on smallholder potato farmer's production in Nyandarua, Kenya.

1.3 Research Objectives

1.3.1 General Research Objective

The general objective of this study was to examine the influence of agricultural information on smallholder potato farmer's production: a case study of Nyandarua County.

1.3.2 Specific Research Objectives

i. To investigate the common sources of agricultural information used by smallholder potato farmers in their production.

ii. To establish the type of agricultural information needed by small holder potato farmers in increasing production.

iii. To examine factors influencing access to agricultural information by smallholder potato farmers.

iv. To determine factors influencing utilization agricultural information smallholder potato farmers.

1.4 Research Questions

i. What are the common sources of agricultural information used by smallholder potato farmers?

ii. What are the type of agricultural information needed by smallholder potato farmers in production?

iii. What are the factors influencing access to agricultural information?

iv. What are factors influencing utilization of agricultural information by smallholder farmers in Nyandarua?

1.5 Scope of the Study

The study was be limited to Nyandarua County which contributes 33% of potatoes produced in Kenya. The potato value chain directly and indirectly supports 101,697 farm families in the County. The potatoes produced in the County have a net worth over Ksh 7.0 billion (Nyandarua County Potato Strategy, 2017-2021). The county was selected because it is a major potato producing region Kenya with numerous smallholder potato

farmers. Other major potato producing counties in the country will not be included in the study.

1.6 Significance of the Study

The study aimed to come up with results that are meaningful and actionable to boost the production of potato farmers in Kenya. Potato is the second most important food crop in Kenya and contributing to the body of knowledge will enable government policy makers in the ministry of agriculture to develop strategies and policy interventions that may enhance production of smallholder farmers. This study provides information that will be useful to actors in the potato value chain e.g. NGOs and Donors, both working at the policy level and in the field by shedding some light on what interventions are likely to enhance production of smallholder farmers. Additional information on the sector will stimulate investments to enhance potato production and facilitate the transformation from subsistence to commercial farming.

This study provides information that will help improve food production in the country by increasing supply chain participation resulting in more availability of potatoes for consumers, wider markets and higher incomes for smallholder potato farmers. This will contribute to increased supply hence increased income and food nutrition security. Private sector actors such as traders and processors will also benefit from a more integrated value chain which will increase the quantity and quality of supply throughout the year.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter reviewed the existing literature on factor influencing accessibility to and use of agricultural information on productivity of smallholder potato farmers. In specific the chapter reviewed the theoretical review, empirical review and conceptual framework.

2.2 Theoretical Review

The study was guided by theory of planned behavior applied to agricultural information.

Theory of Planned Behavior

The theory was developed by (Ajzen, 1991). Theory of Planned Behavior provides an explanation of the involuntary behavior of individuals. It is possible to predict with high accuracy the intents to perform behavior of varying kinds using the attitude one has towards the behavior, subjective norms, perceived control of behavior; and together, the intentions with perception of change in behavior accounts for a great variation in the actual behavior (Fishbein & Ajzen, 1975). It is one of the most influential and cited models for the predictions of human behavior (Ajzen's, 2011).

TPB constitutes three constructs. Each of these constructs plays a role towards the intent of the decision to utilized agricultural information. The constructs of TPB and how each is applied in the decision to utilize agricultural information among smallholder farmers is discussed in the following sections:

Attitudes is a product of behavioral believes. The feeling of an individual is depicted by attitude and so is inclination of declination in behavior performance. The general attitude of prospective user of information towards the use of a particular system based on information or procedure are the key determinants of whether he/she will actually use the information. This construct evaluates the overall behavior as being good or bad and the expectations about the likelihood of certain outcomes that will come from performing the behavior. This construct can be used to ask question such as: How does the farmers attitudes affect their ability to evaluate the outcome of agricultural information being

utilized? Does a behavior belief of rural farmers influence their understanding of agricultural information? Does these utilization of agricultural information by rural farmers increase their productivity?

Subjective norms are perceived as social influence on whether to engage or not to engage in particular behavior and one beliefs of what significant others think they should perform the behavior. The opinion of others regarding agricultural information as well as their feedback will affect behavior of an individual. This construct can be used to ask question such as: How does the smallholder farmers associations influence their choice and use of agricultural information in Nyandarua County? How does an extension officers influence rural farmers in Nyandarua County to utilize agricultural information provided to them? How does co-farmers influence support the utilization of agricultural information by Nyandarua County?

Perceived behavior control (PBC) refers the person's beliefs about the easiness or difficulty in performing the behavior. It suggests if the task will be easy or difficult to accomplish. This construct can be used to ask question such as: How does the perceived easiness or difficulty of agricultural information provided to Nyandarua County influenced their frequency of its utilization? How much effort is involve to smallholder farmers to access and utilize agricultural information? How easy or difficult would it be to rural farmers to interact with an extension worker?

This theory incorporates different aspects of the farmers for instance how smallholder farmers characteristic's affect their attitude and the choices they make in utilizing information. Since the study objectives are the source of agricultural information, type's agricultural information needed, accessibility and utilization of information by smallholder potato farmers in Nyandarua County. The theory provides more clarification and understanding on the smallholder farmer's factors that influence the decision making. Hence the suitability of TPB in establishing the influence agricultural information on smallholder potato farmers production in Nyandarua County.

2.3 Empirical Review

This section reviewed the studies that have been done by other researchers on influence of agricultural information and their impact on productivity of farmers globally.

2.3.1 Sources of Agricultural information

Opara (2008) did a study on agricultural information sources used by farmers in Imo State, Nigeria. The outcomes demonstrated that agricultural extension agents being the primary source of information, fellow farmers, radio, and television ranked respectively in order of importance. The outcomes further demonstrated that larger part favored extension agent compared to the other different media (radio, friends and relatives, TV). The outcomes accentuated the need for the extension agents to routinely identify the sources of information that farmers prefer and utilize most to enable them plan efficient and effective delivery mechanism.

Mokotjo and Kalusopa (2010) did a study on evaluation of the Agricultural Information Service (AIS) in providing agricultural information services to farmers in Maseru district, Lesotho. The study revealed that, even though most of the farmers had acquired primary education, the agricultural information delivered to them was written in local dialects. Print was observed to be a significant sources data among the farmers in Lesotho. This empowered them to use the information effectively. The study recommended regular and continuous training program, active promotion of AIS services, introduction of relevant information channels and encouraging farmers to visit AIS and utilize the existing services. The study was limited to the evaluation of the AIS in Lesotho, however the outcome of the study shed more light on the challenges of the provision of agricultural information in Lesotho and other nations in Africa.

Lwoga, Stilwell and Ngulube (2011) did a study on Access and use of agricultural information and knowledge in Tanzania .The study findings fundamentally contrasted from Mokotjo and Kalusopa (2010). Print materials had low utilization because of their low education levels and inaccessibility for most of the farmers in Tanzania. It was found that knowledge and information needs seeking patterns of farmers were location specific.

Neighbors, friends and family followed by public extension officers were found to be the major sources of information for farmers. Radio and cell phones, advanced technologies (i.e. internet and e-mail) and printed materials were used at a low rate despite their existence in the communities. The study gave a profound understanding of access to and use of agricultural knowledge and information in the rural areas, which necessitated a need for demand-led and customer based knowledge and information services in order to meet the different farmers' needs.

Ijatuyi (2016) studied an analysis of information sources used by fish farmers in Ife Central. The study showed that information sources played an indispensable role in improvement of fish farming, however, the different sources of information did not receive equal attention by farmers. Information sources were found to be in use by the fish farmers in the area. They recorded frequency of their use, information and credibility as perceived by the respondents. Most useful sources of information was found to be mobile phones, radio and other fishermen .It was recommended that farmers should form farmers groups to benefit from being a member of a farmer's organization where they can exchange of ideas. The study recommended that agricultural information should be spread through radio, religious associations were deemed as more reliable, trustworthy and convenient, ICT infrastructures ought to be provided and improvement of the transport system so that modern agricultural information can be relayed on time.

Adegboye et al., (2013) studied on analysis of the sources and effect of extension information on output of women maize farmers in Soba local government area of Kaduna state, Nigeria. The study established the various sources of extension information and the effect of extension on the productivity of women maize farmers. Data analysis showed source of extensive information as radio being important followed by extension agents. It was recommended that the transfer of extension information to women maize farmers through the use of radio and extension agents ought to be united as the vast majority of the respondents got information using these sources while the use of group discussion and field day needed to be strengthened as they are notable media for transferring extension information.

Ugboma (2010) conducted a study on access to agricultural information by fish farmers in the Niger Delta Region of Nigeria, results showed that 63% of the respondents indicated that, their source of information was through traditional, as well as personal experience.

2.3.2 Types of Agricultural Information

Okonya and Kroschel (2014) did a study on Farmers' knowledge and perceptions of potato pests and their management in Uganda. The study was to know if farmers knew the existing insect pest problems and how to manage them. This information would greatly aid in designing suitable intervention measures and successful integrated of pest management strategy. Constrains in potato production were found to be diseases, insect pests, price fluctuations, and low market, in order of de-creasing importance. Significant yield losses were predominantly due to late blight (Phytophthora infestans (Mont). Farmers were found to have on average little to moderate knowledge on pest characteristics. The most used control methods were use of fungicides and insecticides. Just 5% of the farmers knew about insect pests and their natural enemies. This absence of information called for training of both farmers and extension workers in insect pest identification, their biology, and control. The study recommended empowering farmers with information about insect pests in ensuring reduction of pesticide misuse and to conserve the environment by using friendly approaches.

Owolabi, Kehinde and Okunlola (2018) explored utilization of agricultural information and knowledge for improved production by rice farmers in Ondo State, Nigeria. The objective was to examine the utilization of agricultural knowledge and information by the rice farmers. It was revealed that rice farmers in the study area had several information needs for example- information on pests and diseases management practices, mechanical land preparation, planting, use of farm machines, improved storage methods and agricultural access to loans. Access to and utilization of agricultural information to facilitate improvement in rice production cultural practices were found to be generally high among the respondent. Some constraints that farmers faced in utilizing agricultural information and knowledge on improved rice production were ; lack of finances for

technology input purchase/inadequate fund , lack of labor, poor government management and policies, inconsistency of information, poor economic conditions ,lack of suitable to prevailing agro-ecological conditions , untimely information and extremely technical information . Others challenges were insufficient officers, absence of access to cultivable land, language barriers, incompatibility of social and cultural values. Financial instability was found to be a major hindrance to the farmer's success.

Oyeniyi and Olofinsawe (2015) did a study on access and use of agricultural information resources by rural women of Akure North and South Local Government areas of Ondo State Nigeria. The study found a farmers had a strong need for information of all types ranging from crop production which has the highest percentage, pest control, preservation of farm produce, animal treatment, health information, religious information, economic information and political information. It was recommended that all stake holders should work together and put the rural women farmers in empowerment programs, facilitate loans to meet their socio-economic needs, extension workers to ensure that women were given equal privileges to their male counterparts.

Ugboma (2010) did a study on Access to Agricultural Information by Fish Farmers in Niger Delta Region of Nigeria. The study analysed fish farmers who were engaged in fish farming through created fish farms (homestead fishing). These farmers were mostly literate and business minded with fishing being their core business occupation. They depended on statistical reports, research results and market analysis for improved yield and economical gains hence information for this group was therefore found to be very crucial. It was found that there was difficulty in accessing agricultural information by fish farmers which could have created a platform for improved and increased yields of fish and improved profitability and creation of meaningful employment. Information in areas like feeds, fingerlings, credit facilities was found to be available, reliable and relevant information for farmers through the Ministry of Agriculture, National Agricultural Extension and Research Liaison Services (NAERLS), agricultural research centers, libraries and privately organized workshops, seminars, and conferences. However constraints like; insufficient agricultural extension officers, language barriers, lack of use of media and the unreliable nature of electricity in Nigeria hindered accessible of this wealth of information.

2.3.3 Factors Influencing Access of Agricultural Information

Obare et al (2003) did a study on smallholder production structure and rural roads in Africa: the case of Nakuru District, Kenya. The results of this study indicate that a poor road infrastructure increased the cost of smallholder farmers in delivering their goods to the market. Farmers faced with high farm-to-market access costs dedicated less land, fertilizer and machinery resources to production. Pederson (2000) did a study on the changing structure of transport under trade liberalization and globalization and its impact on African development. The study that concurred with Obare et al (2003) findings by concluding that there exist solid microeconomic evidence of the negative impacts of high transport costs on farm productivity and income in Africa.

Oladele (2006) did a study on multilinguality of farm broadcast and agricultural information access in Nigeria. The country has diversity of the languages hence language barrier in farming broadcast programmes on radio and television. For farmers to have access to agricultural information through the radio and television, the language of presentation had to be based dialect of the listeners of which and a farmer cannot know all the languages in a location. The study recommended that providers of information should explore multilingual sources to ensure farmers' get access to agricultural information. Broadcast stations that cover various aspects of agricultural production activities at different times of the year should therefore can remove language barriers through multilingual presentation.

Adomi, Ogbomo and Inoni (2003) did a study on gender factor in crop farmers' access to agricultural information in rural areas of Delta State, Nigeria. The findings showed that there were differences between male and female crop farmers in terms of their information needs and preferred sources of agricultural information. Female crop farmers experienced greater problems in accessing agricultural information. However, the major information problems suffered by farmers are not gender-specific problems and recommended enhancement of all crop farmers' access to agricultural information

Rao (2009) did a study on the framework for implementing Information and Communication Technologies in agricultural development in India. The study found that ICT can become a key enabler of the agricultural-food sector by making dynamic and real time global level exchange of data .Effective use of ICT can lead to increase in agricultural competitiveness by creating cuts in production and transaction costs, raising production efficiencies and farm incomes, conserving natural resources, and providing more information, choice and value to stakeholders. ICT was found to be a key tool in the disseminating of agricultural information to the farmers especially in rural areas where cell phones were widely used by both literate and illiterate farmers.

Obidike (2011) did a study on rural farmers' problems accessing agricultural information: A Case Study of Nsukka Local Government Area of Enugu State, Nigeria. The study revealed that Nsukka rural farmers' were faced by several constraints in their quest to access agricultural information to better their crop and livestock production. This were- poor access roads, poor public relation of extension workers, poor radio and TV signals, lack of electricity and constant power interruptions, poor financial power to purchase newsletters that published useful agricultural information, high illiteracy levels and language barrier in broadcast on radio and TV agricultural information. The study recommended that in order to reduce the constraints in accessing agricultural information farmers proposed; the government to construct good access roads, strengthening of radio and TV reception, rural electrification, building of community libraries ,broadcasting of agricultural information on radio and TV in Nsukka dialect and building of community libraries that have agricultural information.

Gambo and Lasisi (2011) did a study on information needs and information seeking behavior of rural women in Borno State, Nigeria. It was found that women constituted the greatest percentage of the rural population in Nigeria and also form an important part of the labor force by engaging in subsistence trade activities. Unfortunately this role was grossly hindered by lack of information on how to tackle their problems, in areas like health care, illiteracy, early marriages, poverty and ignorance. The women hardly sought information in a formally through formal sources or channels, watching TV and listening to radio was seen as a luxury only men can afford. The conclusion was that women are a hard–working and resourceful group which if properly harnessed can fill the gap required

by the government to achieve its integrated rural development program. It was recommended that there was a need to develop information consciousness among rural women by the provision of efficient, effective and reliable formal information delivery mechanisms.

Nchare (2007) did a study Analyzing factors affecting technical efficiency of Arabica coffee producers in Cameroon. Age was found to influences farmers access to information, younger farmers were found to be more open to adopting new innovations and technology than older farmers, which then would be reflected in higher efficiency and productivity. Older farmers had rarely contacted extension workers and were less inclined to adopt new techniques and modern inputs, whereas younger farmers with greater opportunities for formal education, were more skillful in the search for information and in uptake of new techniques.

2.3.4 Factors Influencing Utilization Agricultural Information

Sani, Boadi, Oladokun, and Kalusopa (2014) did a study on the generation and dissemination of agricultural information to farmers in Nigeria. The study found that there were barriers to information access and utilization. The findings were that farmers faced challenges in relation to information generation and communication which lead to low output in production and lack of sustainability. Some of the issues that emerged were lack of sufficient agricultural knowledge and information that enhanced farmer's participation, collaboration and integration; lack of investment from other agricultural stake holders, high illiteracy levels, language barrier in communicating research findings, poor political making decisions from government officials; poverty of the farmers rendering them uncompetitive. Failure by the government to prioritize agriculture, ineffective ICT policies that are geared towards informing farmers through the ICT tools and where they are available, there was poor access and reception. Lack of training and re-training of both the extension workers and farmers on new innovations as the extension workers were inadequate to cater for the growing population of the farmers.

Adetimehin and Okunlola (2018) did a study on utilization of agricultural information and knowledge for improved production by rice farmers in Ondo State, Nigeria. The

findings showed that information is a vital resource for all agricultural activities, and require for anything and everything. However constraints such as lack of information services, inadequate number of extension staff, lack of financial support, and, information not easily accessible and lack of awareness of information sources have limited farmers in accessing and utilizing agricultural information efficiently.

Lwoga et al., (2011) did a study on access and use of agricultural information and knowledge in Tanzania. The study findings showed existence of a large gap in information and knowledge needs for farmers. The gaps were in controlling of plant diseases and pests, marketing, credit and loan facilities and control of animal diseases. Knowledge and information needs were found to vary across the surveyed communities and were location specific due to variations in development, agricultural activities and agro-ecological conditions. Information on agricultural marketing and soil fertility was sought by men, while women needed knowledge on value added techniques, crop planting and irrigation. Although the study findings showed that there were slight variations in the information needs according to gender, other studies carried out in Nigeria purported there was a definite gender split in the information needs, Adomi& Ogbomo& Inoni, (2003).

Mulima, Bii, and Bosire (2017) did a study on the means of access to agricultural information among famers in Samia sub-county, Kenya. The study aimed to develop a web-based information system that would enhance food security in Samia District. The study found that majority of the farmer's accessed agricultural information through radio, traditional sources and mobile phones. Because of the high access to mobile phones it was recommended that agricultural officers to carry out sensitization seminars and workshops on how farmers can utilize their phones in accessing agricultural information. Availability of internet, web-based devices and related technologies provides a great opportunities to those who are willing to exploit the opportunity.

Lwoga et al., (2011) did study on information and knowledge needs, access and use for small-scale farming in Tanzania. Research concluded that there was a large information and knowledge gap in the districts sampled because the rural information provision services were not driven by the farmers' needs in the surveyed communities. The findings

also suggested that to improve their farming skills, farmers would need to continually to rely on face-to-face interactions and reliance on radio and cell phones more than printed material and advanced ICTs (internet and email) in accessing information and knowledge. They recommended having rural knowledge provision strategies by conducting regular studies on information and knowledge needs, involving farmers in the design and development of agricultural technologies to encourage their use, establishment of community radio that uses vernacular languages and indigenous communication mechanisms, such as drama, storytelling, should be encouraged in the local communities in order to spread relevant knowledge to farmers.

Research done by Aidoo et al., (2016) on agricultural informational flow in informal communication networks of farmers in Ghana found that despite the rapid growth in the use of modern communication media to improve access to agricultural information, local information networks remain an important means of communication among rural folk. Key communicators of agricultural information were found to be significantly older and who had higher farm output than the rest of the population and mostly occupied leadership positions in their community. The recommendations were that extension service providers should target such key communicators when introducing new information and technology as they can serve as essential channels of information to other farmers in the community. It was also observed that network density values were generally low indicating that the networks are open to diverse sources of information. Agricultural extension service providers should identify such farmers who can serve as intermediaries between actors to help disseminate information in rural communities.

2.4 Research Gap

Lwoga, et al., (2011) did a study on access and use of agricultural information and knowledge in Tanzania. The study assessed information needs, access and use of agricultural information and knowledge, and the role of ICTs in disseminating agricultural knowledge and information. Owolabi, Kehinde and Okunlola (2018) did a study on utilization of agricultural information and knowledge for improved production

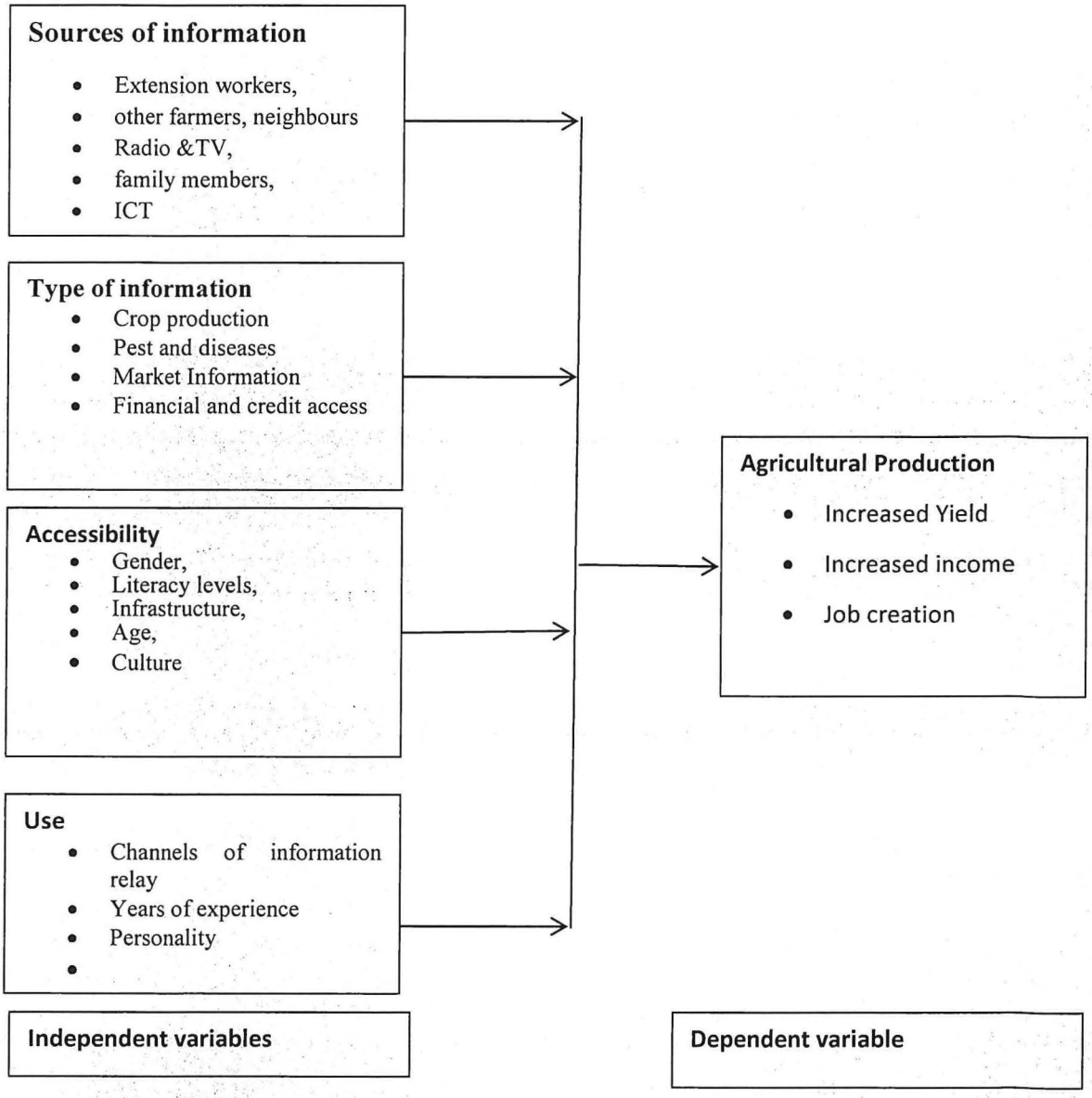
by rice farmers in Ondo State, Nigeria. Sani, Boadi, Oladokun, and Kalusopa (2014) did a research on the generation and dissemination of agricultural information to farmers in Nigeria. The study concluded that there were in challenges in relation to information generation and communication which lead to low output in production and sustainability.

The empirical studies were limited in terms of context, there were conducted in countries such as Tanzania, Nigeria and Lesotho. Therefore the findings cannot be generalized to a Kenyan context. The current study aimed to fill the research gap by assessing the influence of agricultural information and their impact on production of smallholder potato farmers in Nyandarua County, Kenya.

2.5 Conceptual Framework

The representation of the dependent and independent variables being investigated in a study in a diagrammatic form is referred to as conceptual framework. The independent variables of the study are source of information, type of information, access and use, the dependent variable is increased production.

Figure 2.1: Conceptual Framework



Source; Author (2019)

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter explained the methodology used in the research. It highlights the research design, study population, sampling procedure in determining the sample size, the data collection instruments and process, the data analysis, the reliability and validity tests and the ethical considerations that were taken into consideration in the course of the study.

3.2 Research Design

Descriptive research design was adopted. Creswell (2013) indicated that descriptive research is applied in describing situations, behaviors, phenomenon, subjects and situations. It's applied in answering who, when, what, where, and how relating to the question that is being researched. It attempts to gather quantifiable data which can be applied in statistically analyzing targeted audience or subjects. Descriptive research design is also applied in observing and describing a research problem without manipulating it in any way (Creswell, 2013). This research design was therefore suitable in this study because it helped in answering the research questions by describing, explaining and validating research findings.

3.3 Study Population

The target population of the study was smallholder potato farmers in Nyandarua County in Central Kenya. In this instance, the total population of smallholder potato farmers in the country is about 800,000 while the total population of smallholder potato farmers in the Nyandarua county is approximately 101,697 (Nyandarua County Potato Strategy, 2017-2021). The county was selected because it is a main potato producing region in Kenya with many smallholder potato farmers.

3.4 Sampling Design and size

The sample size of this study was drawn from 800,000 smallholder potato farmers .Multistage sampling procedure was used in the selection of a representative sample. The first step involved purposive selection of the county so as to provide a representative

overview of potato production and accessibility to information practices in the country. Nyandarua County was selected because farmers grow potatoes in all sub-counties as their main crop. Secondly, specific sub-counties in the county were selected purposively based on the perceived likelihood of holding the required information. This selection was done in consultation with representatives from the National Potato Council of Kenya, agriculture officers from the Ministry of Agriculture, Livestock and Fisheries in the county, and representatives from the Kenya Agricultural Research Institute (KARI). Finally, smallholder potato farmers in the selected sub-counties were selected randomly to give a total sample of 150 respondents.

The required sample size was determined using Cochran's proportionate to size sampling methodology, Cochran (1977):

$$n = \frac{Z^2 qp}{e^2}$$

Where; n = Sample size; Z= confidence level ($\alpha = 0.05$); p = proportion of the population containing the major interest, $q = 1\text{-}p$ and e = allowable error. Hence, $Z = 1.96$;

In this instance, the total population of smallholder potato farmers in the country is about 800,000 while the total population of smallholder potato farmers in the Nyandarua county is approximately 101,697 (Nyandarua County Potato Strategy, 2017-2021).

Therefore:

$$p = \frac{101,697}{800,000} = 0.12 \quad ; \quad q = 1 - 0.12 = 0.88$$

$$n = \frac{1.96^2 \times 0.12 \times 0.88}{0.05^2} = 150.8$$

3.5 Data Collection Methods

A structured survey will be utilized to gather the primary data. According to Kothari (2011), primary data is that which is collected afresh for the first time while secondary data is that data that has already been collected and passed through the statistical process. A questionnaire was used for data collection. The questionnaire mainly collected primary data. The questionnaire had both structured and unstructured questions, this enabled the collection of quantitative data. The questionnaire was divided into three parts; the first part covered the demographic information, the second part had questions on the independent variables and the third part covered the dependent variable. Using questionnaire in data collection is advantageous mainly because it can access a large group of people and it's economical.

The researcher physically administered the questionnaires to the respondents. The researcher maintained a register of the questionnaires to ensure that the dispatched questionnaires were received after data collection. The researcher was available during data collection to clarify any issues to the respondents. Also given the literacy levels of some respondents, researcher translated the data collection tool to local languages (or Swahili) as appropriate.

3.6 Research Quality

In order to establish validity and reliability of research tool the study performed a pilot test. It involved conducting pre-test of instruments used in data collection and processes of spotting and eradicating errors. Cooper and Schindler (2008) indicated that sample size used in pilot test varies based on time, practicality, and cost and it always ranges between 5-10% of the targeted population. Cooper and Schindler (2008) indicated that it is not necessary to statistically select respondents to be used in a pilot test. The study selected questionnaire as data collection tool and it was tested on 10% of the study's sample which translated to 15 respondents. The respondents' used in the pilot test were excluded from the actual study. The respondents who participated in pilot test were randomly selected from the targeted population. The results of the piloted questionnaires were compared; if they were consistent then the study proceeded to data collection. However if

the results of the pilot were inconsistent then some adjustments were made in the questionnaire before data collection.

Content validity was adopted to determine the validity of the instrument. Content validity is the notion that the sample need to sample range of behavior representing the theoretical concepts that are being investigated. To ascertain validity of the questionnaire, the study used opinion of experts in this field of research and the supervisors. In order to ascertain how appropriate and adequate the instruments were, the experts went through the questionnaire and the research questions carefully. This helped in detecting questions that needed editing and those with ambiguities. The researcher made corrections in the questionnaire ready for data collection.

In order to establish the reliability of the research instruments the researcher used Cronbach's alpha; which is a correlation coefficient between two data sets. Reliability of the questionnaire was determined using the results obtained. According to Cooper and Schindler (2008) the scores that are obtained from the test is referred to as reliability coefficient. The reliability coefficient ranges between 0 and 1. If the value of reliability coefficient is zero it implies that the test score is not reliable. If the value is higher it suggests that the test scores are more reliable. In this study, threshold value of 0.7 and above was acceptable reliability coefficient.

How reliable the questionnaire was, was determined by conducting reliability analysis. Cronbach's Alpha was used. According to Gliem and Gliem (2003) 0.7 is the threshold value of Alpha which was used as the benchmark in this study. Reliability of each objective was determined using Cronbach's alpha. From the findings shown in Table 4.2 Source of Information as an alpha of 0.793, Type of Information as an alpha of 0.864, Accessibility Factors as an alpha of 0.859 and Access and Use has an alpha of 0.801. This shows that all the variables are reliable since they exceeded the threshold value of 0.7.

Table 3.1 Reliability Analysis

Scale	Cronbach's Alpha	Number of Items
Source of Information	**0.793**	**9**
Type of Information	**0.864**	**11**
Accessibility Factors	**0.859**	**11**
Access and Use	**0.801**	**15**

Source: (Survey data, 2019)

3.7 Data Analysis Methods

SPSS version 23 was applied in analyzing the data collected. Referencing of the received questionnaire was done and coding of the items done to facilitate entry of data. The study generated quantitative data. Descriptive statistics data analysis methods such as frequencies, and means were applied in analyzing collected data using closed ended questions. Presentation of data was done in form of tables, 2-D figures and pie charts.

The regression equation model used was of the form;

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

where Y = Dependent variable (Smallholder Potato Farmer's Production), β_0 = Constant (The intercept of the model), β= Coefficient of the X variables (independent variables), (X_1 – sources of agricultural information , X_2 – types of agricultural information, X_3 – factors influencing access of agricultural information and X_4 –access and use of agricultural information.

3.8 Ethical Issues in Research

Ethical clearance was obtained from Strathmore University's Institutional Board before commencement of data collection so as to be granted a permit from National Commission for Science Technology and Innovation (NACOSTI) to carry out the research. The respondents were not coerced to provide information; they were allowed to provide information voluntarily. The respondents were assured of confidentiality and privacy of the information they provide; this ensure that they gave honest and consistent information. In order to ensure anonymity, the respondents were not required to indicate their identity/names in data collection instrument.

CHAPTER FOUR: DATA ANALYSIS, PRESENTATION AND INTERPRETATION

4.1 Introduction

Data analysis, presentation, interpretation, and discussion of findings obtained from data collection are discussed in this chapter. This chapter also presents background information of the respondents and findings of the analysis based on study objectives. To discuss the study findings descriptive statistics was applied. Correlational analysis was conducted to determine the strength of relationship between the study variables. Regression analysis was also conducted so as determine the relationships between independent variables and the dependent variable, and to explore the forms of these relationships. The model summary reports the strength of the relationship between the model and the dependent variable. Analysis of variance determines the significance relationship between the study variables. Beta coefficients compare the strength of the effect of each individual independent variable to the dependent variable. This analysis assisted in understanding the relationship between the study variables. The findings on the relationships may be important to smallholder farmers, since it provides more understanding on how knowledge of agricultural information can increase their production levels.

4.2 Response Rate

The respondents that were used in the study were 150 and all of them were issued with questionnaires, out of which 115 dully filled and returned their questionnaires which translated to a response rate of 77%. The rate of response was considered excellent and suitable to make inference on the study population because according to Mugenda and Mugenda (2003), a rate of response of 50% is considered to be adequate to make analysis and make a report, while a rate of 60% is considered to be good and that of 70% and above is considered to be excellent. In this study our response rate was above 70% and was therefore considered to be excellent. Kothari (2011) advocated for a response rate of 75% or above for academic research.

Table 4.2: Response rate

Category	Frequency	Percentage
Responded	115	77
Not responded	35	33
Total	150	100

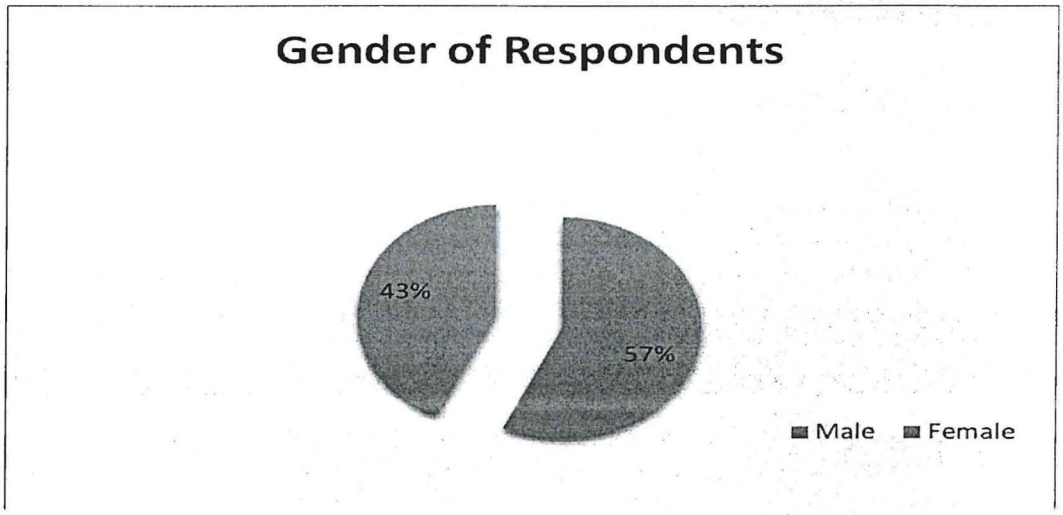
Source: (Survey data, 2019)

4.3 Demographic Information

4.3.1 Gender of Respondents

It was important to establish the gender composition of the respondents as past studies has found a significant difference in perceptions and attitudes towards agricultural information among men and women. Figure 4.1 depicts 57% of the respondents were male whereas the rest were female as shown by 43% respectively. This was an indication that the researcher tried as much as possible to reach both genders to seek opinions on the raised research questions while avoiding gender bias

Figure 4.1: Gender of Respondents

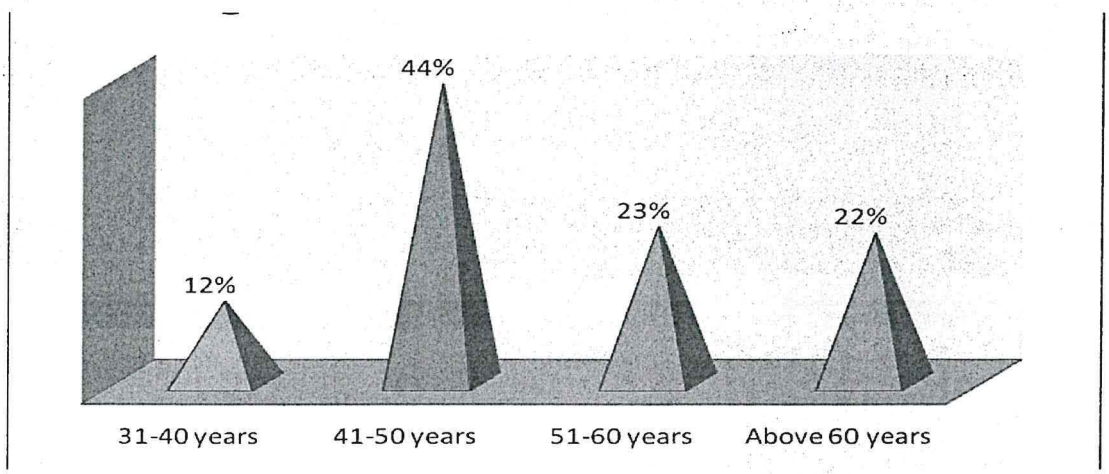


Source: (Survey data, 2019)

4.3.2 Age of the Respondents

The respondents were asked to indicate the age bracket in which they belonged to. The results were as presented in Figure 4.2. According to the results, 44% of the respondents were aged between 41-50 years, 23% said 51-60 years, and 22% said 31-40 years whereas 12% said 31-40 years respectively. In other words, most of the respondents were in their productive age. The result indicates that respondents were in their active age, and hence they are considered productive to the economy. More productivity of potato farming is expected because of the strength and physical ability to manage the farms .The findings of Ronald et al. (2015) show that farmers in their young, active ages would be open to accept innovations and information from sources more easily than their aged colleagues.

Figure 4.2: Age of Respondents



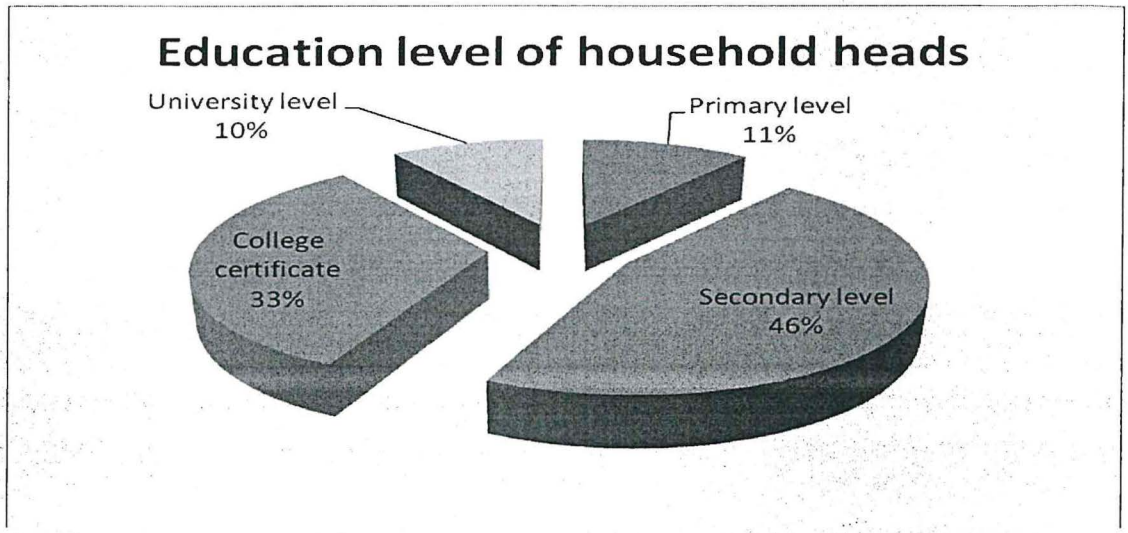
Source: (Survey data, 2019)

4.3.3 Highest level of education of the household head

Respondents were required to indicate the highest level of education of their respondents. Majority of the respondents as shown by 46% indicated that their household heads had

secondary level of education as their highest achievement, 33% said college level, and 11% said primary level whereas 10% indicated university level respectively. The results are as shown in the figure below;

Figure 4.3: Level of Education of the Household Head



Source: (Survey data, 2019)

This means that the household heads were moderately educated, hence able to read and write. In this regard, they were in a position where they could receive agricultural information through various sources including the print media. This high level of literacy could be regarded as an advantage for the choice of source of information for potato production. Such farmers are imbued with the ability to access and appreciate the use of improved technology and best practices in their enterprises (Oke, 2014). This correlates with Gem (2004) survey findings that education plays a pivotal role in the survival of the organization and therefore employees should be exposed to various educational programmes to enable them to acquire knowledge in their respective endeavors. Results of studies in sub-Saharan Africa have shown that male headed households have more access to land, education, and information on new technologies.

4.3.4 Marital status of the household head

Respondents were required by the researcher to indicate the marital status of the household head. According to the findings, 34% said that the households heads were married and living with their spouses, 12% said spouses were away, 12% some household heads were divorced/separated, 10% they that most of them are widowed or widowers whereas 33% said that they were living single respectively. This was an indication that most of the household heads and owners of small scale farms were married with spouses and some were single.

Table 4.3 Marital status of the household head

Status	Frequency	Percent
Married living with spouse	39	34
Married with spouse away	13	12
Divorced/separated	13	12
Widow/widower	12	10
Single	38	33
Total	115	100

Source: (Survey data, 2019)

Getting married is a highly valued among the respondents in the study area. This conforms to the study of Ronald et al. (2014) that farming is practiced mostly by married people to provide for their families. Okoedo- Okojie (2015) stated that married people were regarded to be more responsible and so their views are likely to be respected within the farming communities.

4.3.5 Years of Schooling (Educational Level)

Respondents were asked to indicate their level of education. The results were as presented in

Table 4.4: Years of Schooling in the households

Education level	Frequency	Percent
Secondary level	38	33
College certificate	64	56
University level	13	11
Total	115	100

Source: (Survey data, 2019)

From the findings in table 4.3, majority of the respondents as shown by 56% said that college level education was the highest level of education a member of a household ever achieved, 33% said secondary level whereas 11% said university level education respectively. Based on the mean of years spent in schooling, it was observed that most of the respondents had spent at least some years in school in the study area. This was an implication that at least there was and highly educated person in the households studied who could at least understand concepts related to farming, seeking information on internet, TV and so on. This high level of literacy could be regarded as an advantage for the choice of source of information for potato production. Such farmers are imbued with the ability to access and appreciate the use of improved technology and best practices in their enterprises (Oke, 2014). Previous studies have shown that education is thought to reduce the amount of complexity perceived in a technology thereby increasing a technology's adoption.

4.3.6 Size of acres of the farm

In addition, the majority of the respondents (41%) had a farm size of 1-2 acres, 34 percent had a farm size of 2-3 acres, and only 10 percent had a farm size of above three had a farm size below one acre. This shows that small holder farmers were in the majority in the study area. This dominance is a common in Kenya where farming is

dominated by subsistence and peasant farmers as opposed to commercial or large-scale farmers.

Table 5.4: Size of acres of the farm

Acres	Frequency	Percentage
Below 1 acre	18	15
1-2 acres	48	41
2-3 Acres	39	34
3-5 Acres	10	10
Total	115	100.0

Source: (Survey data, 2019)

Notably, the farmers' educational levels, gender and age had positive and significant influence on the adoption of agricultural information while the variable on males and females adopting agricultural information equally had positive but insignificant influence.

4.4 Descriptive Statistics

Respondents were asked to indicate the level to which they agreed with some statements on the variables that were under study. They used a 5-poing Likert scale where 1- Not important, 2- Less Important, 3- moderately important, 4- Important, and 5- Very important. The results are presented in subsections hereunder.

4.4.1 Sources of Agricultural Information

The results in presented Table 4.5 indicate the sources of information used by respondents in accessing agricultural information in the study area. The section below presents the data analysis relative to the first objective of the study which was to investigate the source of agricultural information and their efficiency.

Table 4.6: Sources of Agricultural Information

Source Of Information	Very Important	Moderately Important	Less Important	Not Important	Mean Score
Farmer groups	13%	86%	1%	0%	0%	4.12
Agro vets	23%	66%	10%	1%	0%	4.11
Government Extension officers	9%	90%	1%	0%	0%	4.08
TV/Radio	12%	84%	2%	2%	0%	4.06
Mobile phone ,Smartphone (internet access)	18%	70%	12%	0%	0%	4.06
Internet, social media- Facebook, YouTube	16%	74%	10%	0%	0%	4.06
NGOs	11%	79%	10%	0%	0%	4.01
Newspaper	12%	82%	2%	2%	2%	4.00
Other farmers	6%	88%	2%	2%	2%	3.94

Source: (Survey data, 2019)

The findings reveal that farmer groups as shown by a mean score of 4.12, of the respondents used information from agro vets as shown by mean score of 4.11, from government extension officers as shown by a mean score 4.08, from TV/Radio as shown by the mean score of 4.06, mobile phone, Smartphone (internet access) as shown by a mean score of 4.06, from Internet, social media- Facebook, YouTube as shown by a mean score of 4.06, from NGOs as shown by a mean score of 4.01,from Newspapers as shown by a mean score of 4.00, from other farmers as shown by 3.94 respectively. None of the respondents mentioned the use of the internet as a source of information for the farmers in this locality. Of significance in this finding is the proportion of farmers who rely on traditional sources to obtain agricultural information and yet these sources do not in any way constitute ICT based information. Apart from agricultural information sourced from agricultural shows which are only organized once a year, information sourced from other traditional ways may not be authentic or scientific and hence unreliable. This perhaps explains why Nyandarua County is slowly creeping into a food insecure region.

The disparity with the scenario in Nyandarua County could be attributed to a number of factors such as the state of roads, availability of vehicles to transport the agricultural officers considering that Nyandarua is vast in coverage and the adequacy in terms of capacity of the agricultural officers. When asked to indicate how the he disseminates agricultural information to the farmers, the District Agricultural Officers indicated as follows: Of concern in this finding also is the low proportion of farmers who receive agricultural information from agricultural extension officers.

Ordinarily, agricultural extension officers should be on the fore front of ensuring that as many farmers as possible obtain reliable agricultural information. This is in contrast with studies carried out in other parts of Africa which report that majority of small scale farmers obtain agricultural information from agricultural extension officers. For instance, Opara (2008) investigated the overall sources of agricultural information available to farmers in Imo State (Nigeria), as well as the farmers' preferred sources. The findings showed that 88.1% of the farmers' source of agricultural information was through extension agents. This findings concur with, Ozowa (2008) study that showed among all the existing channels of communication, farmers in Nigeria ranked extension workers the highest in providing credible information and advice. The investigation was carried out on small farmers in Imo state, Nigeria.

4.4.2 Type of Agricultural Information

This section presents the data analysis based on the second objective which was to establish the type of agricultural information needs of farmers in the study area. The table 4.6 depicts findings on respondents rating on the importance of the types of information required for smallholder farmers to achieve maximum potato production. According to the findings, majority of the respondents were in agreement that the following types of information were important; Pesticides as shown by the mean score of 4.14, marketing as shown by the mean score of 4.14, machinery as shown by the mean score 4.11, fertilizers as shown by the mean score of 4.10, harvesting as shown by the mean score 4.09, diseases control information as shown by the mean score of 4.09, information on use of inputs as shown by the mean score of 4.08, information about labor as shown by the

mean score of 4.06 and information about Certified Seed Potato (CSP) as shown by the mean score of 4.06 respectively.

Table 4.7: Respondents rating on the types of information required

Types Of Information	**Very Important**	**Important**	**Moderate Important**	**Less Important**	**Not Important**	**Mean Score**
Pesticides	15%	84%	1%	0%	0%	4.14
Marketing-	15%	84%	1%	0%	0%	4.14
Machinery	17%	79%	2%	2%	0%	4.11
Fertilizers	11%	88%	1%	0%	0%	4.10
Harvesting	10%	89%	1%	0%	0%	4.09
Diseases control	15%	81%	2%	2%	0%	4.09
Use of inputs	24%	66%	4%	6%	0%	4.08
Labor	18%	70%	12%	0%	0%	4.06
Certified Seed Potato (CSP)	18%	70%	12%	0%	0%	4.06

Source: (Survey data, 2019)

This findings concur with Owolabi, Kehinde and Okunlola (2018) who studied utilization of agricultural information and knowledge for improved production by rice farmers in Nigeria and found that farmers in the area had several information needs comprising of - information on pests and diseases management practices, mechanical land preparation, planting, use of farm machines, improved storage methods and agricultural access to loans.

4.4.3 Factors influencing Access of agricultural information

Table 4.7 depicts findings on respondent's perception on listed factors influencing effective use of agricultural information by smallholder potato farmers. According to the findings displayed, majority of the respondents were in agreement that; Cost as shown by a mean score of 4.38, budgetary constraints as shown by the mean score of 4.14, Farmers training as shown by the mean score of 4.12 , Infrastructure as shown by a mean score of 4.08, Perception and attitudes as shown by a mean score of 4.06 and Farmers culture as shown by a mean score of 4.02 were all factors influencing effective use of agricultural information by smallholder potato farmers to a great extent respectively.

Table 4.8: Factors influencing accessibility

Factors	**Very great extent**	**Great extent**	**Moderate extent**	**Little extent**	**No extent at all**	**Mean score**
Cost	30	66	6	4	0	4.38
Budgetary constraints	12	86	2	2	0	4.14
Farmers training	13	86	0	1	0	4.12
Infrastructure	9	90	0	1	0	4.08
Perception and attitudes	18	70	0	12	0	4.06
Farmers culture	6	90	2	2	2	4.02

Source: (Survey data, 2019)

Ferris (2005) argues that access to accurate, timely and appropriate information enables farmers to make better informed decisions on what to produce, when to produce and where to sell it. Those who have timely access to relevant information can make more rational decisions than those without it.

Table 4.8 depicts findings on respondents rating on accessibility of the listed information by small holder farmers for effective farming practices. According to the results displayed in the table above, majority of the respondents were in agreement that; Information on new potato farming technology as shown by a mean score of 4.17, Information about disease and pest control as shown by a mean score of 4.14, information on market prices as shown by a mean score of 4.06 and information about Certified Seed Potato as shown by a mean score of 3.85 was accessible by small holder farmers for effective farming practices.

Table 4.9: Information Accessibility

	Fully accessible	Accessible	Partly	Rare accessible	Not accessible	Mean score
Information on new potato farming technology	2	4	79	17	0	4.17
Information about disease and pest control	0	1	84	15	0	4.14
Information on market prices	0	12	70	18	0	4.06
Information about Certified Seed Potato	0	10	75	11	0	3.85

Source: (Survey data, 2019)

Clearly, dissemination of agricultural information among farmers in Nyandarua County is still wanting. Maru (2008) notes that having adequate and well-presented scientific, legal and commercial agricultural information will improve the efficiency of rural development, policies, projects and programmes. Agricultural information provision should be the basic component of rural development programmes. Oladele (2011) observes that lack of agricultural information is a key constraining factor that has greatly limited agricultural advancement in developing countries. Therefore, agricultural information interacts with, and influences, agricultural activities in a variety of ways.

This implies that agricultural information helps to inform decision-making regarding land, labor, livestock, capital and management.

4.4.4 Factors Influencing Utilization Agricultural Information

The research further sought to find out the extent of utilization of agricultural information by small scale farmers in Nyandarua County. Like the findings on access to agricultural information, those who reported to be utilizing the information averagely were almost the same proportion of the farmers who indicated that they were accessing agricultural information averagely. Access and utilization of agricultural information needs to go hand in hand; otherwise, the objective of disseminating such information may never be achieved.

Challenges farmers face in accessing agricultural information

1) **Infrastructure**

Table 4.10: Road to the Market

Type	Frequency	Percentage
All Weather	51	44
Tarmac	64	56
Total	115	100.0

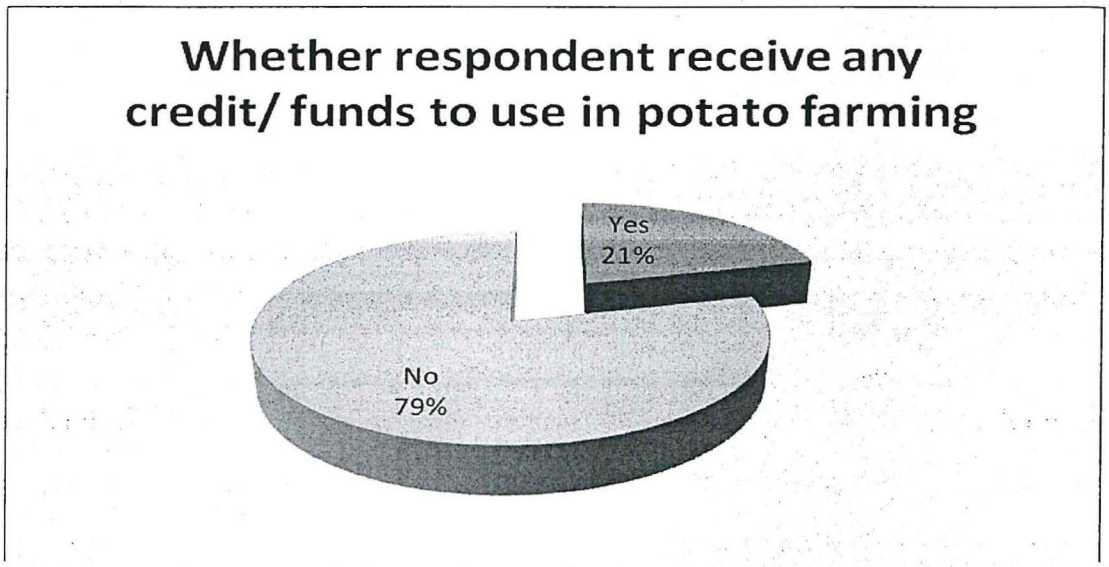
Source: (Survey data, 2019)

The researcher wanted to establish the type of road to the market that respondents used while transporting harvested potatoes. According to majority of the respondents as shown by 56%, most roads were tarmac whereas 44% said that most roads were all weather roads respectively.

2) **Funding Constraints**

The figure below presents findings on whether respondent receive any credit/ funds to use in potato farming. According to the results, 79% of the respondents indicated that farmers do not always receive any credit/ funds to use in potato farming. A few as shown by 21% of the respondents indicated that they receive any credit/ funds to use in potato farming accordingly. This is an implication that in most cases, farmers in Nyandarua counties don't get any funds to use in potato farming business.

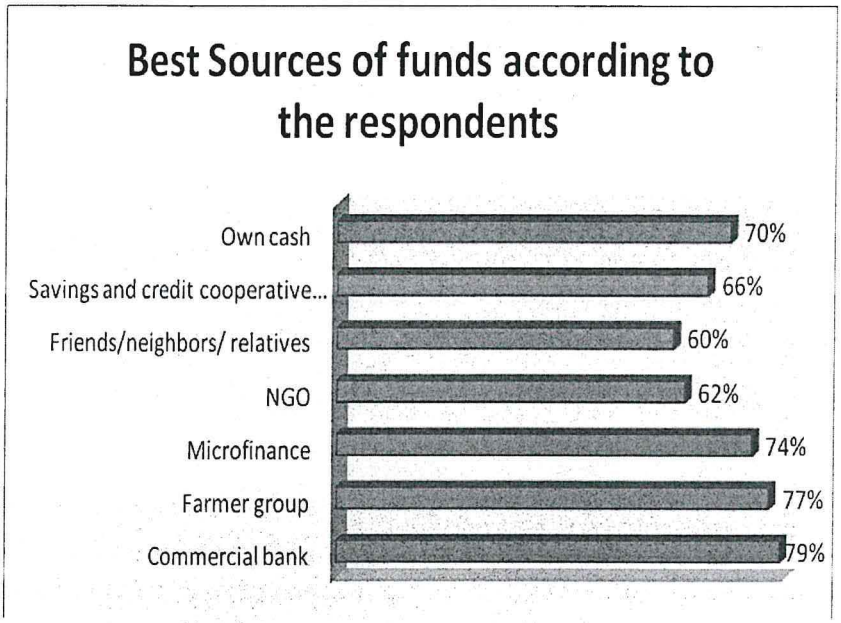
Figure4.4: Credit/ Funds to Use in Potato Farming



Source: (Survey data, 2019)

The figure 4.11 depicts findings on sources of funds according to the respondents. On this question, majority of the respondents as shown by 79% said they could source credit from commercial banks, 77% said farmers groups, 74% said micro finance, 70% said own cash, 66% said Savings and credit cooperative organizations (SACCO), 62% said NGOs whereas 60% said they do source from Friends/neighbors/ relatives respectively.

Figure4.5: Sources of funds



Source: (Survey data, 2019)

Risk Appetite in investment in potato farming

The study sought to know the respondents' level of risk in cash investment in potato farming. On this question, the researcher established that most respondents level of risk in cash investment in potato farming was risk averse as shown by 44%, 34% said risk neutral whereas 22% said risk seekers as drivers to which they get into potato farming respectively. This is an implication that potato farming is a risky business and farmers are always ready to face it as a commercial or subsistence farming activity in Nyandarua County.

Table 4.11: Nature of Risk

Risk levels	Frequency	Percentage
Risk seeker	25	22
Risk averse	51	44
Risk neutral	39	34
Total	115	100

Source: (Survey data, 2019)

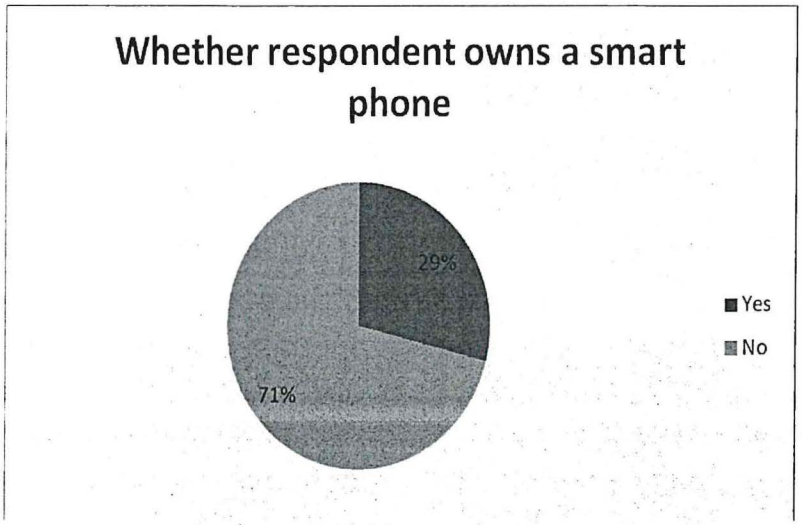
The study sought to know the respondents' level of risk in cash investment in potato farming. On this question, the researcher established that most respondents level of risk in cash investment in potato farming was risk averse as shown by 44%, 34% said risk neutral whereas 22% said risk seekers as drivers to which they get into potato farming respectively. This is an implication that potato farming is a risky business and farmers are always ready to face it as a commercial or subsistence farming activity in Nyandarua County. According to the findings, 34% of the respondents said that much of the credit was used for payment of labor, 32% said buying of farm inputs like fertilizers and pesticides, 23% said small business capital most of which was opening a one point sale of potatoes whereas very few said they sourced for credit to pay school fees. This was a clear indication that most credit sought was committed to farm activities and products.

3) Ownership of a smart phone

The study wanted to establish whether the respondents owned a smart phone. According to the findings, 71% of the respondents said they did not own smart phones. Only a few as shown by 29% of the respondents who said that they owned smart phones as shown in the figure below;

Figure4.6: Ownership of a smart phone

Figure 4. 1 **Ownership of a smart phone**



Source: (Survey data, 2019)

Increased usage of web-based and related technologies opens up great opportunities to those who are ready to undertake them. Nyandarua County population is growing every year and adopting new farming technology would assist much the County in food security and in the country and for the much needed satisfaction of its population.

Cruz (1987) also confirmed that technology adoption was dependent on the characteristics of technology; the adopters, the change agent (extension worker, professional); and the socio-economic, biological, and physical environment in which the technology take place (Cruz, 1987). Cruz also observed that farmers themselves have been seen as major constraint in development process. They are innovators or laggards. Socio psychological trait of farmers is important. With wider access to and use of ICT-based agricultural information, the potentials of opening up of communication as well as sharing information would be enhanced and assist farmers, researchers, extension

workers and policy makers. It will also narrow the information gap that exists between the farmers and the researchers on the other hand because there will be a feedback.

Membership to farmers groups

The researcher sought to establish the respondents' membership to farmer organizations/group. According to the findings, 67% of the respondents agreed that there were farmers groups in the area, 56% agreed that they were members of the farmers groups, a few, 47% of the respondents received training in the last one year, 62% agreed that most training was done by extension officer who visited them whereas 65% of the respondents agreed that they would recommend other farmers to join the farming groups.

Table 4.12: Memberships to Farmer Organizations/group

	Frequency (Yes)	**Percentage (%)**
Is there are farmers groups in the area	77	67
Is respondent a member	64	56
Is respondent received training in the last year	54	47
Were there visits from extension officers 2018	62	54
Were respondents would recommend other farmers to join the farming groups	75	65

Source: (Survey data, 2019)

According to Caswell et al. (2001), exposure to information about new technologies as such significantly affects farmers' choices about it. It was also evident from study that lack of funds, lack of awareness by some of the farmers on use of various sources in accessing agricultural information, poor infrastructure and the irrelevance of agricultural programmes broadcast through various mass media sources were the other challenges they had to contend with. Poor power supply was the main problem the farmers faced

when it came to accessing agricultural information through the mass media. This was true because in some of the study areas, there was no power supply and this hindered the farmers from receiving information through the mass media channels that depend on power supply. The researchers found in the field that in areas where there was electricity connection farmers also relied on television as a source of agricultural information. This can have impact on information accessibility among farmers and hence poor agricultural productivity in the country.

4.5 Inferential Statistics

In order to determine the influence of relationship between Agricultural Information and production, regression analysis was conducted and the findings are shown in subsequent sections.

4.5.1 Model Summary

The table 4.12 below presents the model of estimation on the relationship between the studied variables.

Table 4.13: Regression Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.920[a]	.8464	.8460	.00121	.84479	3437.1	3	3	.000

Source: (Survey data, 2019)

a. Predictors: (constant), (sources of agricultural information, types of relevant agricultural information, factors influencing use of agricultural information and accessibility of agricultural information).

b. Dependent Variable: Smallholder Potato Farmer's Production

Adjusted R squared is coefficient of determination which indicates the variation in the dependent variable due to changes in the independent variables. From table 4.20 above the value of adjusted R square was 0.8460, an indication that there was variation of 84.60% on dependent variable. This means the model provided a good fit in sources of Agricultural Information, Types of Agricultural Information, Factors Influencing use of Agricultural Information and Accessibility of Agricultural Information. In addition, the adjusted multiple coefficient of determination of 0.8460 indicates the high joint impact of the explanatory variables. It means that 84.60% of Smallholder Potato Farmer's Production are explained by the changes in Sources of Agricultural Information, Types of Agricultural Information, Factors Influencing use of Agricultural Information and Accessibility of Agricultural Information whereas 15.40% of expected consumer satisfaction are explained by other factors such as location and demographic factors among others.

4.5.2. Analysis of Variance

In order to determine whether the data that was used in the study was significant, ANOVA was performed. The findings from ANOVA analysis showed that the population parameters had a p-value of 0.010. This suggests that the data was suitable for making conclusion on the population under investigation because the p-value was less than 0.05.

Table 4.14: Analysis of Variance

	Sum of Squares	**Df**	**Mean Square**	**F**	**Sig.**
Regression	528.491	4	132.123	63.528	.000[b]
Residual	91.509	44	2.080		
Total	**620.000**	**48**			

a. **Dependent** Variable: *Smallholder Potato Farmer's Production*

b. **Predictors**: *(constant), (sources of agricultural information, types of agricultural information, factors influencing access of agricultural information and factors influencing utilization of agricultural information).*

As shown in Table 4.13, the value of F critical is 63.528, this shows that the overall regression model had significant influence on prediction of the relationship between *agricultural information* and production.

4.5.3 Regression Coefficients

The findings of the regression beta coefficients are shown in Table 4.11 below.

Table 4.15: Regression Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.231	.134		9.672	.000
	Sources Of Agricultural Information	.467	.025	.104	-1.448	.009
	Types Of Relevant Agricultural Information,	.508	.020	-.062	-.868	.006
	Factors Influencing Use Of Agricultural Information	.114	.018	.045	-.782	.005
	Accessibility Of Agricultural Information	.324	.071	.222	.608	.017

Source: (Survey data, 2019)

From Table 4.13, the following regression model is established;

$$\mathbf{Y = 2.231+0.467X_1 + 0.508X_2 + + 0.114X_3 +0.324X_4}$$

The Table 4.21 above presents the regression Model for Smallholder Potato Farmer's Production. The figures in the above table were generated through the use of SPSS data analysis and established the following regression equation;

The study found that when independent variables ((X1 – sources of agricultural information , X2 – types of agricultural information, X3 – factors influencing access of agricultural information and X4 –access and use of agricultural information) were kept constant at zero expected Smallholder Potato Farmer's Production will be at 2.231. A unit increase in sources of agricultural information will lead to an increase in expected Smallholder Potato Farmer's Production in Nyandarua county by a factor of 0.467; a unit increase in types of relevant agricultural information will lead to an increase in Smallholder Potato Farmer's Production in Nyandarua county by a factor of 0.508 , a unit increase in factors influencing use of agricultural information will lead to an increase in Smallholder Potato Farmer's Production in Nyandarua county by a factor of 0.114 while a unit increase in accessibility of agricultural information will lead to an increase in expected Smallholder Potato Farmer's Production in Nyandarua county by a factor of 0.324. The table also shows that the X variables (independent variables), (X1 – sources of agricultural information, X2 – types of relevant agricultural information, X3 – factors influencing use of agricultural information and X4 -accessibility of agricultural information with Y= Smallholder Potato Farmer's Production in Nyandarua county were significant at 5% level of significance and 95% level of confidence at .009, .006 .005 and .017respectively.

CHAPTER FIVE: DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

Summary of the findings, conclusions and recommendations are presented in this chapter. The objectives of the study were addressed by the conclusions and recommendations made.

5.2 Discussions of Findings

This section covers the discussion of findings on the influence of source, type, access and use of agricultural information and their effect on smallholder potato farmer's production

5.2.1 Sources of Agricultural Information

The study found out that farmers sought information from agro vets as it was easy and convenient, other sources were government extension officers, TV/Radio, social media-Facebook, YouTube ranked highly and from other farmers who were experienced in potato farming: This findings were in line with Ijatuyi (2016) who studied information sources used by fish farmers in Ife Central and found that fish farmer's gender and membership of social organizations had a significant effect and utilization of the information sources available with mobile phones, radio and professional colleagues being the most useful sources of information. This finding were also supported by Lwoga, Ngulube and Stilwell (2012) study on Information and knowledge needs, access and use for small-scale farming in Tanzania findings that the major sources of information for farmers were predominantly local with most respondents indicating public extension as an important source of agricultural information, village meetings and farmer groups and printed information had low use. The theory of planned behavior supports the study in that farmers attitudes affect their ability to evaluate the outcome of agricultural information being utilized and their beliefs behavior belief of rural farmers influence their understanding of agricultural information.

5.2.2 Type of Agricultural Information

The study established that majority of the respondents were in agreement that the following types of information were important; Pesticides, Marketing, machinery ,fertilizers, diseases control information, input use of information and information about Certified Seed Potato (CSP) were important. This findings concur with Owolabi, Kehinde and Okunlola (2018) who studied utilization of agricultural information and knowledge for improved production by rice farmers in Nigeria and found that farmers in the area had several information needs comprising of - information on pests and diseases management practices, mechanical land preparation, planting, use of farm machines, improved storage methods and agricultural access to loans. The theory of planned behavior supports the study in that the need of information influence their behavior on smallholder farmers.

5.2.3 Factors Influencing Access of Agricultural Information

The study established that majority of the respondents were in agreement that; Cost, budgetary constraints, Infrastructure ,gender, age, were all factors influencing effective uptake of agricultural information by smallholder potato farmers to a great extent respectively. The findings agree with the findings of Obidike (2011) study on rural farmers' problems accessing agricultural information: A Case Study of Nsukka Local Government Area of Enugu State, Nigeria which several constraints were found to be encountered by the farmers in their quest to access agricultural information they included lack of access roads and constant power interruptions in their communities, poor financial power, illiteracy, poor public relation of extension workers, poor radio and television signals, and language barrier because agricultural information was not being broadcast on radio and television in local language.

5.2.4 Factors Influencing Utilization of Agricultural Information

It was established from the study that the biggest challenge in effective access and utilization of agricultural information was financial constraints, respondents' level of risk in cash investment in potato farming was risk averse an implication that potato farming is

a risky business and farmers. Farmers lack credit/ funds to use in potato farming, and they could not source credit from commercial banks. The findings are in agreement with Adetimehin and Okunlola (2018) who did a study on utilization of agricultural information and knowledge for improved production by rice farmers in Ondo State, Nigeria. The findings showed that information was a very important resource for all agricultural value chain activities, however due to lack of information services, lack of financial support, and inadequate number of extension staff, information inaccessibility and lack of awareness of information sources they were limited in accessing and utilizing agricultural information efficiently. The theory of planned behavior supports the study in that smallholder farmers associations influence their choice and use of agricultural information in Nyandarua.

5.3 Conclusions

The study concluded that most sources of agriculture information is from: farmer groups, from Agro vets, least from government extension officers, from TV/Radio on some stations like Inooro TV, mobile phone, Smartphone (internet access), from Internet, social media- Facebook, YouTube, from NGOs, least from Newspapers from other farmers as in that order respectively.

The study concludes that the following types of information were important; Pesticides, Marketing, machinery, fertilizers, harvesting, diseases control information, information on use of inputs, information about labor and information about Certified Seed Potato (CSP) respectively. According to the findings, the study concluded that, there were few farmers groups in the area, a few farmers were members of the farmers groups that offered many types of agricultural information, a few, farmers received training in the last one year that most training was done by extension officer who visited them whereas most farmers would recommend other farmers to join the farming groups.

According to the findings the study concluded that, cost, budgetary constraints, farmers training of all kinds, infrastructure, perception and attitudes and farmers culture were all factors influencing accessibility of agricultural information by smallholder potato farmers to a great extent.

The study found that access to and the effective of use of agricultural information on production was hindered by several constrains. The study concluded that in most cases, farmers in Nyandarua County don't get any funds to use in potato farming business hence finance being the biggest challenge. Potato growing was mostly for subsistence and commercial reasons as farmers considered it a risky business given the unpredictable climate change and increased infestation by pest and diseases.

The study concluded that farmers learnt from the information provided that one can source credit from commercial banks, farmers groups, micro finance, raising own cash, savings and credit cooperative organizations (SACCO), NGOs and from Friends/neighbors/ relatives respectively. A lot of the credit was used for payment of labor and buying of farm inputs like fertilizers and pesticides, as well as small business capital most used for opening a one point sale of potatoes.

5.4 Recommendations

Adequate workshops, training and awareness should be given to the potato farmers and be promoted by the Nyandarua county government, private organizations and other stakeholders involved, with the welfare and livelihood of Nyandarua residents. This could be achieved especially by increasing the number of extension officers for the researcher though they were limited compared to the many smallholder farmers in the county.

For easy access and effective utilization of agricultural information in this digital age, there is need for establishment of information centers in all rural communities in Kenya which could provide the rural farmers with the desired agricultural information in a format that would be easy to understand for them, considering the prevailing high illiteracy rate, cultural differences.

The study recommends that household heads be financed and be trained to have skills on internet access and usage, especially through the use of smart phones and computers (for this was found to be limited on how many owns one) for the information obtained may help them improve on farming skills which will at the same time be transferred to the relatives and farm managers employed or involved in day to day farming activities.

Agricultural research institutes should carry out ways of reducing the invasion of potato farmers by pests' especially late blight and bacterial wilt these are very difficult pests that affect output of the farmers.

More information should be disseminated through the radio and religious organizations because the farmers consider these sources reliable and credible. Extension agencies should be more active in disseminating information to the potato farmers and in encouraging them to subscribe to various potato farmer groups that exist around the neighborhoods, hence making information more easily accessible.

5.5 Limitations of the Study

The study was limited to small holder farmers in Nyandarua County only. The study assessed the effect of using relevant agricultural information, the source and type of information on production level. The study also used questionnaires as the only instrument of data collection. The smallholders who farm potatoes in Nyandarua County were the target only. Further, the study adopted a descriptive research design.

5.6 Suggestions for further studies

This study recommends that further studies be undertaken to establish the role of community radio, mobile phones and television in disseminating agricultural information for effective agricultural practices in the local communities. The linkages between face to face communication and ICTs need to be investigated for effective agricultural performance in African countries, particularly in rural areas. In this case, further studies could include more Kenyan counties especially Bomet, Laikipia and Nakuru County to find out if the results will be the same.

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APPENDICES

Appendix 1: Introduction Letter

OUR REF: **YOUR REF:**

(Date)

To whom it may concern,
[Name stakeholder/institution]
P.O. Box .....
NAIROBI
Dear [name],

RE: INTRODUCTION LETTER

Caroline Mbugua is a final year post graduate student at **Strathmore Business School** and she is conducting a survey study for her research project. This research concerns an analysis of the influence of agricultural information on smallholder potato farmers production because of the growing demand for potato in the country and untapped production potential in the sector.

The student seeks to conduct in-depth interviews/focus group discussions which should take no more than an hour to complete.
We assure you of full confidentiality on all information given and anonymity. The information will also be fully available to you upon request.

In the event that you have any queries or that you require any independent clarification about this study, please do not hesitate to contact the Administrator at Strathmore Business School on +254 727 969 372.
Yours faithfully,

Appendix 2: Consent Letter

Dear Respondent,

We are a group of MBA students from Strathmore Business School conducting a study analysis of the influence of agricultural information on smallholder potato farmer's production.

The results of the study will help us give valuable feedback, and advise smallholder farmers on what needs to be done to maximize of potato productivity.

You have been randomly selected to complete a brief questionnaire containing questions that directly address our study objectives. Please fill all the questions legibly.

For confidentiality purpose, do not write your name on the questionnaire. The researcher will collect the questionnaire by Friday March 8, 2019. Participation in this exercise is voluntary and you are free to withdraw from the research process at any given time without any consequence.

For follow up on study results, please feel free to call one of the researchers conducting this study at 0711264028.

Your participation in this questionnaire is greatly appreciated.

Sincerely,

Caroline Mbugua

Strathmore Business School

Appendix 3: Questionnaire

Enumerator Name: _____

Respondent Number: _____

Date _____

Analysis of the Influence of Agricultural Information on Smallholder Potato Farmers Production 2018/2019

Thank you for agreeing to speak with me.

My name is [ ] and I am conducting a survey study on a master's research project analysis of the influence of agricultural information on smallholder potato farmers production in Nyandarua County. The findings of this research will contribute to the discussion regarding the development of information needs for smallholder farmers thus your participation is very important and will be highly appreciated. This survey is not mandatory, it should take no more than thirty minutes of your time, and you are assured of full confidentiality on all information given and anonymity.

Potato farmers have been selected randomly for the survey and we would like to collect information that is set out in this questionnaire.

As mentioned, we value confidentiality and we will ensure that all the answers you provide are kept confidential. If you have any questions or comments about this survey, you may contact Dr. Simon Wagura Ndiritu, Tel: 0722590559, Email: sndiritu@strathmore.edu.

STARTING TIME.....

END TIME .....

House Hold ID.....

SECTION A: HOUSEHOLD (HH) PROFILE

We shall define HH head as the final decision maker in the HH and the household members as all people permanently living in this compound, cooking, and eating from the same pot. This section contains questions relating to general household information and socioeconomic factors.

A01. Are you the **head** of this household?		*1 = Yes* *2 = No* *0 = Do not know*
A02. What is your **relationship to the household head**?		*1 = Wife* *4 = Mother* *2 = Son* *5 = Other, specify* *3 = Daughter*

*I will now ask questions about the **head of your household**, so about you if you have replied yes to the previous question [A01]. If you not please respond for the person who is considered as the head of household [refer to the status mentioned in A02].*

What is the gender of **Respondent**?		*1= Female 2 = Male*
A03. What is the gender of **household head**?		*1= Female 2 = Male 3=Both*
A04. What is the gender of **potato farming manager**?		*1= Female 2 = Male 3=Both*
A05. What is the **highest level of education** of the household head (years of schooling)?		*0 = None/Illiterate* *1 = Adult education or 1 year of education* ** Give other education in years*
A06. What is the **marital status** of household head?		*1 = Married living with spouse* *2 = Married but spouse away* *3 = Divorced/separated* *4 = Widow/widower* *5 = Never married* *6 = Other, specify*
A07. How **old is the household head**?		*Enter number, in years*
A08. How many **people** are in your **household**?		*Enter number*
A09. What is the **highest level of education** in this household?		*0 = None/Illiterate* *1 = Adult education or 1 year of education* ** Give other education in years*
A10. Is **potato farming this household's main activity**?		*1 = Yes* *0 = Do not know* *2 = No*
A11. Who **provides labor** at the farm **(CAN BE SEVERAL)**		1. Casual workers 2. Family member 3. Both

			4. Others,specify
A12. What are your current farmers' production practices/techniques for potato			*1. Intercrop potato* *2. Use of fertilizers* *3. Practice crop rotation* *4. Use of hired labor* *5. Use of family labor* *6. Use of variety mixtures in potato* *7. Irrigate potato* *8. If others specify*
A13. Ownership status of the farm?			*1=Owned by Household* *2=Leased* *3.other, specify*
A14. What is the size of your farm in acres?			Acres
A15. How many acres is under potato cultivation?			Acres

SECTION B: SOURCES OF AGRICULTURAL INFORMATION

This section contains questions relating to source of information and their perceived level importance.

Please indicate to what extent you perceive these sources of information as important. On a scale of 1-5 where 5= very great extent, 4= great extent, 3= moderate extent, 2= little extent and 1= Not at all

Source Of Information	**1**	**2**	**3**	**4**	**5**
B01. Government Extension officers					
B02. NGOs					
B03.Other farmers					
B04.Agro vets					
B05.Farmer groups					
B06.Internet, social media- Facebook, YouTube					
B07.Newspaper					
B08.TV/Radio					
B09.Mobile phone ,Smartphone (internet access)					

SECTION C: TYPES OF AGRICULTURAL INFORMATION

This section contains questions relating to type of information required for smallholder farmers to achieve maximum production.

Please indicate to what level of importance these types of information are to you as a smallholder farmer. On a scale of 1-5 where 5= very important, 4= important, 3= somewhat important, 2= not very important and 1= Not at all important

C01. Type Of Information	**1**	**2**	**3**	**4**	**5**
Fertilizers					
Pesticides					
Machinery					
Labor					
Use of inputs					
Harvesting					
Marketing-					
Diseases control					
Certified Seed Potato (CSP)					
Other, specify					

I will now ask you question on memberships to a farmer organizations

C02. Is there a farmers group in the area?		*1 = Yes* *2 = No* *3 = Do not know*
C03. If yes in C18, are you a member?		*1 = Yes* *2 = No* *3 = Do not know*
C04. If yes, how many are you in the group?		*Number*
C05. What kind of benefits do you receive from the farmers group? *(GIVE TWO BENEFITS)*		Give benefits
C06. Did you receive training in the last year		*1=Yes* *2=No* *If yes Specify*
C07. If yes, how many times did you attend		*Enter number*
C08. If you were invited and did not attended, why?		*Give reason*
C09. Did you have visits from extension officers 2018?		*1=Yes* *2=No* *3=others Specify*
C10. If Yes in C09, How many extension officer visits or trainings did you receive?		*Number of times*
C11. Would you recommend other farmers to join the farming groups		*1=Yes* *2=No* *3=others Specify*

SECTION D: FACTORS INFLUENCING ACCESS TO AGRICULTURAL INFORMATION

I will now ask you question on Mobile phone usage

D01. Do you own a smartphone?		*1 = Yes* *0 = Do not know* *2 = No*
D02.Are you a member of farmers WhatsApp group, Facebook group?		*1 = Yes* *0 = Do not know* *2 = No*
D03.If Yes, do you get meaningful agricultural information from the group?		*1 = Yes-sometimes* *2=Yes-all the times* *3 =No* *4=Do not know*
D04.How far from your farm is the main market for potatoes produce and inputs		*Kms*
D05.How far from your farm is the main market		Walking time (minutes and hours)
D06. What is the type of road to the market		*1 = All weather road* *2 = Tarmac* *3 = Do not know*
D07.What is your perceived condition of the road to the market?		*1 = poor* *2 = good* *3 = Do not know*

Please rate accessibility for small holder farmers of needed information for effective farming practices ***(tick where appropriate)***

	Fully	**Largely**	**Partly**	**Very little**	**None**
Information about Certified Seed Potato					
Information about disease and pest control					
Information on new potato farming technology					
Information on market prices					

E. UTILIZATION OF AGRICULTURAL INFORMATION.

I will now ask questions relating to level of production.

E01. Why do you grow potatoes?		*1=Subsistence purposes* *2=Commercial purposes* *3=Both*
E02. Quantity of Potatoes **Harvested** in the last season 2018		*Enter number KG*
E03.Quantity of Potatoes **sold** in the last season (KG		*Enter number KG*
E04.Selling Price (shillings) per bag (50kgs)		*Enter number KSh*
E05. Quantity of Potatoes **Consumed** by household in the		*Enter number KG*

last season		

I will now ask questions to determine accessibility to credit facility

E06. What is your level of risk in cash investment in potato farming?		*1.Risk Seeker* *2.Risk Averse* *3.Risk Neutral*
E07. Did you receive any credit/ funds to use in potato farming,		*Yes 2.No*
E08. If Yes, What is your **main** source of credit *(GIVE SEVERAL SOURCES)*		*1. Commercial bank* *Farmer group* *microfinance* *NGO* *Friends/neighbours/ relatives* *Savings and credit* *cooperative organizations* *(SACCO)* *Own cash* *Others, specify*
E09. If Yes ,what was the purpose of getting credit		*Small business capital* *Education (pay school fees)* *Buy farm inputs (seeds, chemicals)* *Payment for farm labor* *Personal (medical and home)*

I will now ask questions on factors influencing effective use of agricultural information.

The table below shows the perceived Factors influencing effective use of agricultural information by smallholder potato farmers. Please indicate to what extent these Factors influence this effective use. On a scale of 1-5 where 5= Very great extent, 4= Great extent, 3= Moderate extent, 2= little extent and 1= Not at all.

Factors	**1**	**2**	**3**	**4**	**5**
Cost					
Infrastructure					
Farmers training					
Budgetary constraints					
Perception and attitudes					
Farmers culture					