

**STRATEGIES USED BY SMALL SCALE FARMERS IN  
AINABKOI, UASIN GISHU COUNTY, KENYA**

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**A RESEARCH PROJECT SUBMITTED IN PARTIAL  
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## DECLARATION

This research project is my original work and has not been presented for a degree in any other university.

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## **DEDICATION**

I dedicate this research project to my family for encouraging and motivating me to go ahead relentlessly and advance my education.

## **ACKNOWLEDGEMENT**

First and foremost, I would like to give praise and honors to the Almighty God for giving me sufficient grace and power to write this research project. I would also specifically thank my supervisor, Professor John Yabs, for the commitment and advice he gave me during my research work, not forgetting my friends and my fellow students for their sincere support and encouragement

## ABSTRACT

From ancient civilizations, societies have sought to increase agricultural productivity by making use of farming techniques and strategies. Poverty and declining agricultural productivity are deeply related problems in Kenya and all are likely to be exacerbated by the impacts of population increase, land fragmentation and climatic change. The objective of the study was to establish strategies used by small scale farmers in Ainabkoi, Uasin Gishu County, Kenya. The theories that this study were resource-based view theory and the Schlossberg's transition theory. Descriptive survey research design was adopted by the researcher. The target population of the study was 11,436 small-scale farmers and 4 extension officers located in the Ainabkoi sub-county department of agriculture. The researcher sampled 390 respondents. The researcher used stratified random sampling to select the respondents that participated in the study. The study used self-administered structured questionnaires to collect data. A pilot test enabled the determination of the reliability of the research questionnaire and ensure its validity. Content validity and face validity of research questionnaire was achieved through consultations with the supervisor. Reliability of the research questionnaire was tested using Cronbach's alpha coefficient. The study findings indicate that it was generally agreed that the number of animals stocked, integration of animal and crop farming has enhanced productivity. There was general agreement that they practice horticulture crops which have increased income in the farm. The researcher established that it was consented that the use of automated equipment, internet accessibility, use of electric gadgets and use of automated machines has boosted productivity. The study found out that it was generally agreed that type of quality seeds used, type of feeds given to animals, types of breeds and type of crop inputs has led to increased productivity. Firstly, the study concludes that farmers have increased number of animals, done mixed farming and practiced horticulture in transitioning from subsistence to commercial farming. Secondly, it is concluded that automation of equipment and machines, internet access and use of electronic gadgets enhances agricultural productivity in transitioning from subsistence to commercial farming. Thirdly, the researcher concludes that the use of quality seeds and breeds increases productivity in transitioning from subsistence to commercial farming. It was recommended that land use transition strategy, use of modern technology and use of quality seeds and breeds should be enhanced in order to improve productivity. To future researchers and academicians, this study recommends that a study should be done in other regions to examine the effectiveness of strategies used by farmers in enhancing productivity.

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## **LIST OF ABBREVIATIONS/ACRONYMS**

<b>CPSB</b>	County Public Service Board
<b>EA</b>	East Africa
<b>FAO</b>	Food and Agriculture Organization
<b>KNBS</b>	Kenya National Bureau of Statistics
<b>MOA</b>	Ministry of Agriculture
<b>UG</b>	Uasin Gishu

# CHAPTER ONE

## INTRODUCTION

### 1.1 Background of the Study

In emerging economies, the majority of the rural population are purely engaged with agriculture production. This means that agriculture plays a major role in sustaining livelihoods both in rural and urban places where families are dependent on it for survival. Subsistence farming for a long period of time has continued to be practiced in many homes. Benegiamo and Borrelli (2020) define subsistence farming as a type of agriculture production where produce is meant for consumption while surplus being sold. In contrast, commercial farming according to Hepp, Bruun, and de Neergaard (2019) is one where agricultural production is meant for selling to generate income. Recent changes in the agricultural sector have seen a shift from subsistence farming to commercial farming.

Emergence of agribusiness across developing and developed countries as prompted a shift from subsistence to commercial farming (Benegiamo & Borrelli, 2020). Governments and other relevant authorities have continued to devise transitional strategies that seek to transform subsistence to commercial farming (Hazell, 2018). World food organizations, for example, Food and Agriculture Organization (FAO) pointed that these transitions are slow despite notable strategies in place (FAO, 2019). Hazell (2018) further, estimated that 68.1% of the population in Africa are still practicing subsistence farming. This particular statistic is reflected in many other developing countries especially agricultural production regions in Kenya. The open system theory, resource-based view theory and the theory of the firm explains the relevance of emerging trends in agribusinesses.

The contextual framework of the study will be based on collection of data from the fiels in Uasin Gishu County. In this study, the transition from subsistence to commercial farming requires the perception of small-scale farmers. It is more likely that the small-scale farmers will perceive this transition to be beneficial to them and therefore adopt it as part of their practices. Therefore, guided by the theory the study

will seek to establish the transition strategies that enable the small-scale farmers to transit from subsistence to commercial farming.

### **1.1.1 Concept of Strategy**

Strategy is a long term plan used by firms to attain their objectives. Strategy is used in business organizations that seek to transform processes from low to high productive performances. It is therefore defined by Coquil, Dedieu and Beguin (2017) as the process of applying techniques and methods to improve the current performance to a more desirable one in the future. This was further adopted in Agriculture where several authors have defined it; Kansanga *et al* (2019) define it as methods, and techniques to transform agricultural production from low yields to higher yields. Naswem and Ejembi (2017) define the term as the process of reviving methods and processes of crop and animal production to have the desired level of outputs. Hence, from the definitions it easy to note that transition strategies in Agriculture are concerned with making changes in methods or techniques of production to bring out higher desired outputs.

There are various methods or techniques that can be changed which can then result in transitional strategies in agriculture. The study will adopt three transition strategies that were compounded by Goto and Douangneune (2017). These three transition strategies in agriculture include; better land-use transition, improved technology transition, and better seed rate transitions. Better land use involves making changes on ways to use the scarce land available for production while improved technology is employing suitable mechanization to enhance performance. Lastly, better seed rates involve using quality seeds and breeds to enhance crop and animal production respectively. Goto and Douangneune (2017) further noted that these transition strategies are suitable for small- or large-scale farmers who intend to commercialize their level of production.

### **1.1.2 Subsistence and Commercial Farming**

In context of the size of the farm and quantity of produce, subsistence and commercial farming have been defined differently by many authors. In developed countries, according to Piras, Botnarenco, Masotti and Vittuari (2021) subsistence

farming refers to agricultural production for local consumption only where nothing is sold to external markets. While, in undeveloped countries, Benegiamo et al (2020) defines subsistence farming as that low production that is mean for consumption and only surplus can be sold. Furthermore, the author states that subsistence farming is more prevalent with small scale farmers. Kenya, is a developing country therefore a large number of its agricultural production is for subsistence.

Several factors have led to the commercialization of farming. The high demand for food and increased unemployment have made many farmers shift to commercial farming. Sarasini and Linder (2018) define commercialized farming as the type of agriculture that involves the use of complicated machinery and farm inputs to increase production or yields that can be exported or sold to the markets. In commercialized farming, the main focus is on increasing outputs by using suitable technologies, methods, and techniques (Valencia, Wittman & Blesh, 2019). The transition from subsistence to commercial farming among small-scale farmers, therefore, requires suitable strategies to be employed.

### **1.1.3 Small Scale Farmers in Kenya**

Agriculture in Kenya is predominantly carried out on a small-scale level (Omondi, 2019). A large number of these small-scale productions are done in small farms ranging between 0.2 to 3 acreages mainly for consumption with surplus maybe being sold in some of the local markets (Tsonchovska, 2020). According to the Ministry of Agriculture in Kenya, small-scale farming contributes to about 70% of the agricultural production in the country. This is estimated to be inadequate to meet the national demand for food because it contributes to about 75%. Kenya is known because of its food crops for export e.g., coffee, tea, sugar cane and cotton (M.O.A, 2019). All these food crops are grown on a larger scale because for a long period they were controlled by white settlers and currently companies. Other crops and animals in the country are grown at smaller scale. But the most predominant is cereal growing and poultry stocking (Krone, Dannenberg & Graham, 2019).

There have been several initiatives that have been advanced by the National and County governments to enhance sustainable agricultural practices among small scale

farmers across the country (Barasa, 2019). In Uasin Gishu County, in different sub counties, especially the Ainabkoi sub county, farmers have been empowered by the agricultural departments to use quality breeds and seeds, employ mechanization and technologies in crop and animal production. Ainabkoi sub county is predominantly small-scale farmers raising cattle and growing crops like; maize, wheat, and potatoes (Chebet *et al*, 2017). The department of agriculture in the county in its strategic plan was seeking to commercialize production within the county in order to become a food hub to feed other nearby counties.

## **1.2 Research Problem**

From ancient civilizations, societies have sought to increase agricultural productivity by making use of farming techniques and strategies (Goto & Douangneune, 2017). Poverty and declining agricultural productivity are deeply related problems in Kenya and all are likely to be exacerbated by the impacts of population increase, land fragmentation and climatic change (Naswem & Ejembi, 2017). This have further necessitated new sustainable agricultural strategies to be developed and implemented among communities and societies to curb the 25% food shortage in the country. According to technocratic agribusiness scholars, subsistence farmers are currently obligated to adopt suitable and relevant strategies to commercialize their operations.

A number of studies reviewed have pointed methodological and theoretical gaps that necessitate the study to be conducted. Yamoah, O’Caoimh, Donnelly, and Sawaya (2014) study showed that transition of commercial herb from subsistence farming among Meru farmers is slow despite its viability. Kirimi, Gitau and Olunga (2013) study showed that 78% of the small-scale farmers who had embraced commercialization farming had their income levels increased simultaneously. Langat, Nyangweso, Mutwol, Gohole and Yaninek (2013) in their study observed the key contribution of mechanization in transiting to commercial banana farming in Western Kenya. Even though these studies are related to the current study they have not directly explained the strategies used among small scale farmers to transit from subsistence to commercial farming.

Farmers in Ainabkoi sub county are producing 15% of the total county produce this is according to Department of Agriculture, Uasin Gishu County report of 2019. Despite the sub county having favourable conditions for agriculture and strategic advocacy by the Uasin Gishu county government there is still expected crop and animal productivity. The problem is supported by the 2019 census that showed that majority of farmers registered themselves as subsistence farmers (KNBS, 2019). Tsonchovska (2020) observes that given its scale and scope, the subsistence to commercial transition is a challenge to the entire agricultural sector and may explain the case of lower productivity in other regions. The main question in this study is, what strategies support the transition process from subsistence to commercial farming among small scale farmers in Ainabkoi Sub County?

### **1.3 Research Objectives**

The objective of the study was to establish strategies used by small scale farmers in Ainabkoi, Uasin Gishu County, Kenya.

### **1.4 Value of the study**

The study is hoped to provide insightful in supplementing information that will guide policymaking, managerial experience, and theory development. Information relating to transition strategies from subsistence to commercial farming will enable policymakers in the Agricultural sector to design relevant strategies that will transform crop and animal production in the country. These agricultural policies will provide guidelines that would sustain agriculture in the country. Those policy-making institutions expected to benefit include; Ministry of Agriculture in National and County Governments, and other Agricultural sponsoring institutions.

Furthermore, the empirical and theoretical findings are expected to be of significance to agricultural farmers on both small and large scales. These findings can enable the farmers to adopt suitable practices that enable them to transit from small-scale to commercial farming. The main focus of agribusiness is to ensure that there is the commercialization of productivity across the country. Farmers will employ these

transition strategies to enhance productivity and therefore increasing their income levels.

Lastly, the study is expected to provide enriching theoretical and empirical findings for study and research. This means that scholars/academicians and researchers can use findings as secondary data for learning and literature review purposes respectively. Researchers will use the study to identify gaps that can be used for future studies. The findings will complement more data on strategic management and agricultural practices which will be available in university online and library platforms.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

Literature review provides theoretical and empirical studies related with the purpose of the study. The review enables the research understand the study problem and establish gaps that these studies did not address. Credible secondary sources of data were used to in these chapter. A summary of theoretical, conceptualizing and methodological gaps is presented in the knowledge gap section.

#### **2.2 Theoretical Foundation of the Study**

The theories that this study were resource-based view theory and the Schlossberg's transition theory.

##### **2.2.1 Open Systems Theory**

Open systems theory states that firms operate within certain environments and are affected by environmental forces. They should take into considerations these environmental forces. This is more prevalent in agricultural farms that depend on weather conditions for the success of the crops.

##### **2.2.1 Resource-based View Theory**

This theory states that the success of firms largely depends on number of resources a firm command, and especially the quality of the resources. They should be available mostly for the firms so that it becomes competitive against its competitors.

##### **2.2.2 Schlossberg's Transition Theory**

The study will be guided by the transition theory which was advanced by Nancy Schlossberg in 1984. According to the theory the following premises hold; adults or



groups continuously pass-through stages, events, and non-events reactions to transitions solely depend on the type of transitions, and the transitions is a process is a long-time process and does not have endpoints. This theory, therefore, states that when individuals learn a new situation, they easily adapt and allow change to take place. Furthermore, the study points to three general transition enablers; Firstly, identification of resources that would enable the transition process, second, adopting new resources that would likely bring change, and lastly, anticipating that change can occur.

The theory is applicable to the study because it seeks to understand the various elements that propel the transition to take place in events. In this case, the transition is from subsistence to commercial farming. Transition strategies in reflection to the theory are resources and efforts that enable the transition to evolve and bring desired changes. The study further explains that changes are depended on the type of transitions to be employed and it's a continuous long process. Consequently, if the subsistence farmers wish to transit to commercial farming, they will only be influenced by the type of strategies to be used. Hence farmers need to look at this farming as a continuous transition.

### **2.3 Transition Strategies from Subsistence to Commercial Farming**

Transition strategies are methods, techniques and procedures of transforming operations from low to higher levels (Coquil, Dedieu and Beguin, 2017). Transition from subsistence to commercial farming have been described by several authors, Hepp, Bruun and de Neergaard (2019) describes it as a means of increasing crop and animal yields which is aimed at growing agricultural income. Martin *et. al* (2018) describes it as the process of improving farming operations to capitalize on the market demand and supply. These two different studies clearly illustrate the concept of improvement in farming activities. Therefore, methods, techniques or systems are required to improve farming practices to transit from subsistence to commercial farming.

Eastwood, Ayre, Nettle and Rue (2019) states the use of smart farming methodologies to enhance crop and animal productivity. According to the authors

farmers can use automated technologies and gadgets to tract, control and forecast operations in the farm.

For example; using farming software's to plan, record and store data in the farm. In a different view Hazell (2018) looks at transition strategies in agriculture as an effective way of using available land to increase productivity. According to Hazel (2018), land is the major resource in agriculture therefore it needs to be used appropriately without any wastages. Commercialization of agriculture involves effective use of land for productivity. Valencia, Wittman, and Blesh (2019) differ from the two studies by mentioning that subsistence farmers can commercialize their farms by using quality breeds and seeds in their farmers. Hence, this study will adopt the three strategies mentioned in the three studies as transistors from subsistence to commercial farming.

## **2.4 Empirical Review and Knowledge Gaps**

This section discusses the related studies undertaken by researchers thereby identifying knowledge gaps to be addressed by the current study. It covers literature that have establish transition strategies from subsistence to commercial small-scale farmers. The basis of the evaluation is based on the types of transitions (land use, technological, seed and breed) and the extent to which they contribute to transition from subsistence to commercial farming. The review of the empirical studies will enable the study to establish the gaps to be filled by the current study and enrich the study conceptualization process.

### **2.4.1 Subsistence to Commercial Farming Using Land Utilization Strategies**

Several authors have described the transition of subsistence farming to commercialized farming methods by embracing land use strategy. Bachev (2019) describes land use strategy as a guideline which promotes the use of mixed-use development, compacting and efficient utilization of land. Likewise, Coquil, Dedieu and Beguin (2017) defines land use as the process of efficient land distribution and partitioning aimed at increasing productivity. Farmers with small tracks of land can transit to commercialized farming by utilizing their farms effectively.

Several studies have shown the need to capitalize land use increase productivity. Omondi (2019) established that commercialization of poultry was achieved among farmers found in urban regions in Kenya. Farmers in these urban localities with small parcel of lands can utilize their space by stocking thousands of chickens thus increasing productivity. In the same way, Valencia, Wittman and Blesh (2019) stated that zero grazing is another technique that productivity can be enhanced among subsistence farmers. According to the authors the use of zero techniques enables the farmers to use small spaces and stock high productive breeds. Larger quantities of milk are proven to be achieved through zero grazing than the normal traditional methods.

Mixed cropping is another type of farming technique used to utilize land use, according to Goto and Douangneune (2017) farmers in New Delhi urban regions have been using mixed intercropping farming in their homes to use the available land effectively. This mixed cropping increases in yields, and families have enough for consumption and sales. Another study by Sarasini and Linder (2018) showed that farmers are benefitting from mixing crop and animal production in their farms. This study which was conducted among small scale farmers in South Zimbabwe which established that there is mutual gain between the two types of farming thus diversification of operations and high productivity.

Other farmers due to inadequate acreage have resorted to growing other crops. As pointed by Chebet *et al.* (2017) in a study to establish the effect of farm size on productivity of Maize in Uasin Gishu. The study found that many farmers have moved from subsistence maize farming to horticultural commercial farming due to their small farm sizes. About 55% of the farmers interviewed had resorted to growing horticultural crops because returns are quick and require small parcel of lands. This study is further supported by Coquil, Dedieu and Beguin (2017) who observed that the type of crop to be planted for commercialization purposes among small holder farmers is dictated with the size of the farm.

#### **2.4.2 Subsistence to Commercial Farming Using Modern Technologies**

In recent times the use of technology in farming practices cannot be ignored entirely. According to Fukai, Xangsayasane, Manikham and Mitchell (2019) farming technology strategy is the use of electronic automated systems, software's and gadgets to manage operations or provide solutions to various farming decisions. Successful farmers have recently adopted automated technologies to improve crop and livestock production which is regarded as commercialization. Subsistence farmers can now commercialize their farms by embracing automated modern technologies for their farming needs.

The link between internet and agriculture was fully outlined by a study by Janc, Czapiewski and Wójcik (2019). The study established that farmers have benefited significantly through the internet in accessing information on how to manage their farms. Farmers with internet linkage are able to share information regarding market conditions and search new information globally. Another study by Kansanga *et al* (2019) observed that small scale farmers in Kumasi Ghana have embraced modern communication techniques like the websites to sell their farming produce this has translated to higher income and awareness among its customers.

Farmers in indigenous regions of Mwakimbe in Uganda are using mobile phones to track farming activities, this is according to a study by Krone, Dannenberg & Graham (2019).

These farmers have special software's installed in there that they can use to track the gestation and lactation period of the cattle's, estimate growth rates of their crops and animals. The use of the mobile software has enabled the farmers to increase their yields significantly by reducing unnecessary delays. Sarasini and Linder (2018) study in Netherlands showed that farmers are using automated gadgets set stationery in their farms to detect soil moistures or temperatures. This have improved decision making in balancing the amount of water used for irrigation of food crops.

In Northern Korea and other regions in Japan, automated robots are substituting manual systems in farms. This is was observed by a study by Martin *et al* (2018), who stated that the use of automated robots for spraying livestock's, harvesting and

packing of food produce have increased productivity significantly. Although, Africa is far from using such technologies, a large number of farmers have now embraced automated machines and equipment's in their farms. Chebet *et al* (2017) provides an example of a new technology that is used for spraying large sizes of maize farms in Kenya using drones. Fukai *et al* (2019) mentions the use of automated machines that are used to harvest and dry rice in Malawian farms, and lastly, there have been the use of automated driven machines to harvest potatoes in many regions in Africa.

### **2.4.3 Subsistence to Commercial Farming by Embracing Quality Seeds and Breeds**

A number of authors have sought to expansively explain the use of quality breeds and seeds as a route to commercialize farming. According to Benegiamo and Borrelli (2020) quality breeds and seeds is a way in which farmers decide to use high rated quality seeds and breeds for their production substituting traditional ones. Agarwal and Agrawal (2017) observe that subsistence farmers can commercialize their farming practices by adopting high yield seeds and breeds in their farmers.

A study that sought to establish farmers' ability to transit from low yields crops to use high values crops among crop smallholders was conducted in Nepal by Mishra, Shaik, Khanal and Bairagi (2018). This study established that higher yields were achievable by using highvalued crops. Similarly, another study that needed to prove the need to use improved breeds was conducted by Piras, Botnarenco, Masotti & Vittuari (2021). This study sought to establish the influence of using improved breeds of cattle over the traditional breeds of cattle in Mexico. The study did observe that high milk production was achieved if farmers embrace better breeds of cattle. These two studies conducted in Nepal and Mexico provide justifications of the need to transit from subsistence to commercial farming by use of quality seeds and better breeds of cattle.

Barasa (2019) did a study that sought to find Irish potatoes varieties production in Trans Nzoia. The study found that type 2a of the Irish potato variety in the region is

highly preferred by majority of the farmers this is because of its high yielding characteristics.

Similarly, Chebet *et al* (2007) mentions that maize production in Uasin Gishu is highly depended on the type of seeds planted by the farmers. The study found that 67% of the farmers interviewed preferred 6-23/6-24 maize varieties because of their high quantitative production yields. In respect to milk production, Kansanga *et al* (2019) observed that majority of East African farmers preferred to raise Friesians and Ayrshire because of the quantity and quality of the milk they produce respectively.

Studies have shown that commercialization in animal production depends on the type of feeds that animals are given. For example, Kansanga *et al* (2019) stated that commercialization of animal production requires farmers to use certified approved feeds that fully supplement the animal's diet. Likewise, crop production can also be improved if the right inputs like fertilizers, foliage and chemicals are used this is according to Barasa (2019) who stated that potatoes yields can increase significantly if the right chemicals and fertilizers are used by the farmers.

## **2.5 Empirical Review and Knowledge Gaps**

The several reviewed related studies locally, nationally and internationally have independently showed the transition of subsistence to commercial farming. For example; Sarasini and Linder (2018), Goto and Douangngeune (2017), Coquil, Dedieu and Beguin (2017), Benegiamo and Borrelli (2020), Chebet *et al.* (2017), Barasa (2019) and other studies have both illustrated the transitional strategies that subsistence farmers are using to commercialize their operations. Based on the need and the purpose to conduct the study in the current locality, the study finds it worthy to fill the gap that no study has been conducted to embrace all these strategies. Furthermore, in reference to the statement of the problem the study seeks to fulfil theoretical and empirical gaps explaining transition strategies from subsistence to commercial farming in the study region.

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

The section provides the systematic procedure in which the study purpose was actualized by the research. The systematic procedure involved setting out the design to be utilized, identifying the key respondents or informants, and obtaining the required sample size. Furthermore, the study established and administered the right instruments to be used to collect information from the study respondents. The data collected was later analysed which was the basis of chapters four and five documentations.

#### **3.2 Research Design**

The research design represents the guideline that will be employed in developing a study methodology to be followed (Dźwigoł & Dźwigoł-Barosz, 2018). The study used the descriptive survey research design method. Descriptive survey seeks to obtain comprehensive information from a selected target population. The research design is appropriate and pertinent for this study because more information is required to answer the study objectives (Kumar, 2018).

#### **3.3 Population of Study**

The target of the population represents individuals, units and objects that the study seeks to obtain useful information to support the study objectives (Aithal, 2017). The target population of the study was 11,436 small-scale farmers and 4 extension officers located in the Ainabkoi sub-county department of Agriculture. The number of small-scale farmers was obtained from the Kenya National Bureau Statistics, 2019 housing, and population census database. While the agricultural officer numbers were obtained from the County public service board of Uasin Gishu 2021. The population summary is shown in Table 3.1.

**Table 3.1: Target Population Distribution**

Ward/Location (strata)	Frequency (No. of farmers)
Kapsoya ward	1034
Kaptagat ward	4966
Ainabkoi/Olare	5436
Total number of small-scale farmers	11436
Number of extension officers	4
<b>Grand total</b>	<b>11440</b>

Source: KNBS, Housing & Population census 2019, UG county public service board 2019

### 3.4 Sample Size and Sampling Procedure

The sample size is a minimization process of the number of respondents to be studied from the target population (Aithal, 2017). The small-scale farmers were sampled therefore they were subjected to a sample size determination formula. The sample size was obtained using Yamane formula which is illustrated as follows:

$$n = \frac{N}{1 + Ne^2}$$

Where:

N=Target population to be

sampled n=sample size

e=error of sampling=0.05

$$n = \frac{11436}{1 + 11436 (0.05)^2}$$

$$n = 386$$

The study sampled 386 small-scale farmers from a population of 11,436. Two sampling techniques were used in the study. Due to a few numbers of agricultural extension officers (4), the study employed the purposive sampling technique. Daniel, Kumar, and Omar (2018) define the purposive sampling technique as a non-probability method that chooses respondents with biasness due to the nature of the information to be sought by the researcher. The study employed a stratified sampling



technique to obtain 386 small-scale farmers from a target population of 11436. Daniel et al (2018) define the stratified sampling technique as a method of obtaining randomly a sample of respondents from a defined stratum grouping. Table 3.2 shows the stratified sampling technique.

**Table 3.2 Stratified Sampling Technique**

<b>Strata (ward)</b>	<b>Target population</b>	<b>Sample size</b>
Kapsoya ward	1034	$1034/11436 * 386 = 35$
Kaptagat ward	4966	$4966/11436 * 386 = 168$
Ainabkoi/Olare	5436	$5436/11436 * 386 = 183$
<b>Totals</b>	<b>11436</b>	<b>386</b>

The study sampled 35, 168, and 183 small scale farmers from Kapsoya, Kaptagat, and Olare wards respectively using simple random sampling technique.

### **3.5 Data Collection**

The study collected both qualitative and quantitative data to provide suitable inferences for the study. Data was collected using semi-structured questionnaires which was administered to the farmers and agricultural extension officers. Aithal (2017) agrees that the questionnaire is suitable for a large population and information is required within a short period of time.

The process of collecting data began by seeking authorization from the relevant institutions and organizations. The instrument questions was structured according to the objectives of the study. Data from the pilot study in the neighbouring sub-county (Soy ward among 10% respondents) was used to test for reliability tests while supervisor guidance was helpful in validating the research questions. A pilot test enabled the determination of the reliability of the research questionnaire and ensure its validity. Content validity and face validity of research questionnaire was achieved through consultations with the supervisor. Reliability of the research questionnaire was tested using Cronbach's alpha coefficient. With the aid of research assistants, the

data collection process took a period of 20 days. Storage of the raw data then took place.

### **3.6 Data Analysis**

Data analysis is the last stage of the methodology process where raw data is converted into useful information (White, 2019). According to the author, it involves the process of coding, analysis and interpretation of the findings to obtain meaningful inferences. Quantitative data was analysed using descriptive statistics. Descriptive statistics involved the use of frequencies, percentages, means and standard deviations.

## CHAPTER FOUR

### DATA ANALYSIS, RESULTS AND DISCUSSIONS

#### 4.1 Introduction

In this chapter, the response rate, background information of respondents, results of descriptive statistics and inferential statistical results are presented in line with the study variables and objectives.

#### 4.2 Response Rate

The researcher distributed a total of 390 questionnaires. Only 280 questionnaires were duly filled and returned. The response rate, which was 71.8%, was excellent for analysis and reporting (Kothari & Garg, 2014). The analysis on response rate is depicted in Table 4.1.

**Table 4.1: Response Rate**

	<b>Frequency</b>	<b>Percent</b>
Questionnaires duly filled and returned	280	71.8
Questionnaires not returned	110	28.2
Total	390	100.00

#### 4.3 Reliability Test Results

The Cronbach's alpha coefficient was used to assess the reliability of the research questionnaire. The results of analysis are shown in Table 4.2.

**Table 4.2: Reliability of the Research Questionnaire**

<b>Constructs</b>	<b>Cronbach's Alpha</b>	<b>Test Items</b>
Land use transition strategy	0.800	4
Use of quality seeds and breeds	0.787	4
Use of modern technology	0.753	4

The results indicated that land use transition strategy had the highest Cronbach's alpha coefficient (0.800). It was noted that use of quality seeds and breeds had the second highest Cronbach's alpha coefficient (0.787). Use of modern technology had the third highest Cronbach's alpha coefficient (0.753). This implies that the research questionnaire was reliable as all the six variables had Cronbach's alpha coefficients greater than 0.7.

#### **4.4 Background Information**

The study sought background information from the respondents. This included gender, period of time in small-scale farming, educational level, type of farming activity and annual income level.

##### **4.4.1 Distribution of Respondents by Gender**

This study also examined how the respondents were distributed according to their gender. The results of the analysis are presented in Table 4.3.

**Table 4.3: Distribution of Respondents by Gender**

<b>Gender of respondent</b>	<b>Frequency</b>	<b>Percent</b>
Male	156	55.7
Female	124	44.3
Total	280	100.0

From table 4.3 it was established that 156 (55.7%) respondents were male while 124 (44.3%) were female. This implies that the respondents were fairly distributed in terms of gender.

##### **4.4.2 Distribution of Respondents by Period of Time in Small Scale Farming**

The study also examined the distribution of respondents based on period of time in small-scale farming. Results of analysis are shown in Table 4.4.

**Table 4.4: Distribution of Respondents by Period of Time in Small-Scale Farming**

<b>Time</b>	<b>Frequency</b>	<b>Percent</b>
Below 5 years	103	36.8
6 to 10 years	92	32.9
Above 10 years	85	30.4
Total	280	100.0

It was found out that 103 (36.8%) respondents had been in small-scale farming for less than 5 years. 92 (32.9%) respondents had been in small-scale farming for a period of between 6 to 10 years. 85 (30.4%) respondents had been in small-scale farming for more than 10 years.

#### **4.4.3 Distribution of Respondents by Educational Level**

The study further sought to ascertain the highest academic qualifications of respondents. These results are shown in Table 4.5.

**Table 4.5: Highest Educational Level of Respondents**

<b>Educational Level</b>	<b>Frequency</b>	<b>Percent</b>
Diploma	115	41.1
Secondary	48	17.1
Degree	45	16.1
Primary	34	12.1
Post graduate	24	8.6
Certificate	14	5.0
Total	280	100.0

The study established that 115 (41.1%) respondents had attained diploma education. It was also found out that 48 (17.1%) respondents had attained secondary education. 45 (16.1%) respondents were graduates. 34 (12.1%) respondents had attained primary education. 24 (8.6%) respondents had attained post graduate education. 14 (5.0%) respondents had attained certificate education.

#### 4.4.4 Distribution of Respondents by Type of Farming Activity

The researcher also analysed the distribution of respondents according to the type of farming activity. These findings are presented in Table 4.6.

**Table 4.6: Type of Farming Activity**

<b>Farming activity</b>	<b>Frequency</b>	<b>Percent</b>
Mixed farming	218	77.9
Livestock farming	36	12.9
Crop farming	26	9.3
Total	280	100.0

The researcher found out that 218 (77.9%) respondents practiced mixed farming. 36 (12.9%) respondents practiced livestock farming. 26 (9.3%) respondents practiced crop farming.

#### 4.4.5 Distribution of Respondents by Annual Income Level

The researcher also analysed the distribution of respondents according to annual income level. These findings are presented in Table 4.7.

**Table 4.7: Annual Income Level**

<b>Income level</b>	<b>Frequency</b>	<b>Percent</b>
100,001 to 200,000	201	71.8
Above 200,000	79	28.2
Total	280	100.0

The researcher found out that 201 (71.8%) respondents earned income of between Kshs 100,001 to Kshs 200,000 annually. 79 (28.2%) respondents earned income of over Kshs 200,000 annually.

#### 4.5 Descriptive Analysis

The researcher also sought the opinions of respondents on and use transition strategy, use of modern technology and use of quality seeds and breeds. The respondents were

required to indicate their level of agreement/disagreement with various statements on a five-point Likert scale. The frequencies (Freq.) and percentages (Perc.), means and standard deviations (STD) for each response were recorded.

#### 4.5.1 Land Use Transition Strategy

The researcher examined the type of farming practices adopted by respondents. The results of analysis are shown in Table 4.8.

**Table 4.8: Type of Farming Practices**

<b>Time</b>	<b>Frequency</b>	<b>Percent</b>
Mixed cropping	227	81.1
Zero grazing	53	18.9
Total	280	100.0

The findings indicate that 227 (81.1%) respondents practiced mixed cropping. 53 (18.9%) respondents practiced zero grazing.

The study also sought the opinion of respondents on land use transition strategy. The results of analysis are presented in Table 4.9.

**Table 4.9: Opinion of Respondents on Land Use Transition Strategy**

		<b>Total</b>	<b>SD</b>	<b>D</b>	<b>NT</b>	<b>A</b>	<b>SA</b>	<b>Mean</b>	<b>STD</b>
The number of animals stocked has increased productivity	Freq.	97	9	32	74	111	54	3.60	1.025
	Perc.	100	3.2	11.4	26.4	39.6	19.3		
I intercrop in my farm which increases the crop yields	Freq.	97	29	44	54	90	63	3.41	1.278
	Perc.	100	10.4	15.7	19.3	32.1	22.5		
The integration of animals and crop	Freq.	97	17	31	44	120	68	3.68	1.137
	Perc.	100	6.1	11.1	15.7	42.9	24.3		

---

farming	have									
enhanced										
productivity										
I	practice	Freq.	97	19	27	55	121	58	3.61	1.121
horticulture	crops	Perc.	100	6.8	9.6	19.6	43.2	20.7		
which	have									
increased income in										
the farm										

---

The study found out that 41 (14.5%) respondents disagreed that the number of animals stocked has increased productivity. 165 (58.9%) respondents agreed that the number of animals stocked has increased productivity. It was generally agreed that the number of animals stocked has increased productivity (mean = 3.60; STD = 1.025). It was established that 73 (26.1%) respondents disagreed that they intercrop in their farms which increases the crop yields. 153 (54.6%) respondents agreed that they intercrop in their farms which increases the crop yields. The respondents were undecided on whether they intercrop in their farms which increases the crop yields or not (mean = 3.41; STD = 1.278).

The researcher noted that 48 (17.2%) respondents disagreed that the integration of animals and crop farming have enhanced productivity. 188 (67.2%) respondents agreed that the integration of animals and crop farming have enhanced productivity. The researcher established that there was general agreement that the integration of animals and crop farming have enhanced productivity (mean = 3.68; STD = 1.137). It was noted that 46 (16.4%) respondents disagreed that they practice horticulture crops which have increased income in the farm. 179 (63.9%) respondents agreed that they practice horticulture crops which have increased income in the farm. There was general agreement that they practice horticulture crops which have increased income in the farm (mean = 3.61; STD = 1.121).

#### **4.5.2 Use of Modern Technology**

The researcher sought to find out the farming technology used by farmers. The results of analysis are shown in Table 4.10.





**Table 4.10: Farming Technology**

<b>Time</b>	<b>Frequency</b>	<b>Percent</b>
Automated machines	181	64.6
Automated equipment	52	18.6
The internet	43	15.4
Electronic gadgets	4	1.4
Total	280	100.0

The findings indicate that 181 (64.6%) respondents used automated machines. 52 (18.6%) respondents used automated equipment. 43 (15.4%) respondents used the internet. 4 (1.4%) respondents used electronic gadgets.

The researcher also examined the opinion of respondents on use of modern technology. The results of analysis are shown in Table 4.11.

**Table 4.11: Opinion of Respondents on Use of Modern Technology**

		<b>Total</b>	<b>SD</b>	<b>D</b>	<b>NT</b>	<b>A</b>	<b>SA</b>	<b>Mean</b>	<b>STD</b>
The use of automated equipment's has increased productivity	Freq.	97	10	28	68	100	74	3.71	1.073
	Perc.	100	3.6	10.0	24.3	35.7	26.4		
The accessibility of internet/websites have enhanced yields	Freq.	97	16	32	63	114	55	3.57	1.102
	Perc.	100	5.7	11.4	22.5	40.7	19.6		
The use of electric gadgets for decision making as enhanced productivity	Freq.	97	11	25	73	106	65	3.67	1.050
	Perc.	100	3.9	8.9	26.1	37.9	23.2		
The use of automated machines has improved productivity	Freq.	97	19	29	59	112	61	3.60	1.138
	Perc.	100	6.8	10.4	21.1	40.0	21.8		

The study determined that 38 (13.6%) respondent disagreed that the use of automated equipment's has increased productivity. 174 (62.1%) respondents agreed that the use of automated equipment's has increased productivity. It was consented that the use of automated equipment's has increased productivity (mean = 3.71; STD = 1.073). It was established that 48 (17.1%) respondent disagreed that the accessibility of internet/websites have enhanced yields. 169 (60.3%) respondents agreed that the accessibility of internet/websites have enhanced yields. It was generally agreed that the accessibility of internet/websites have enhanced yields (mean = 3.57; STD = 1.102).

The researcher noted that 36 (12.8%) respondents disagreed that the use of electric gadgets for decision making as enhanced productivity. 171 (61.1%) respondents agreed that the use of electric gadgets for decision making as enhanced productivity. There was general agreement that the use of electric gadgets for decision making as enhanced productivity (mean = 3.67; STD = 1.050). It was noted that 48 (17.2%) respondents disagreed that the use of automated machines has improved productivity. 173 (61.8%) respondents agreed that the use of automated machines has improved productivity. It was consented that the use of automated machines has improved productivity (mean = 3.60; STD = 1.138).

#### 4.5.3 Use of Quality Seeds and Breeds

The study sought to find out the factors guiding farming practices. The results of analysis are presented in Table 4.12.

**Table 4.12: Factors Guiding Farming Practices**

<b>Time</b>	<b>Frequency</b>	<b>Percent</b>
Type of breeds, type of seed rates, type of feeds and type of crop inputs	227	81.1
Type of breeds	53	18.9
Total	280	100.0

The findings indicate that 227 (81.1%) respondents agreed that type of breeds, type of seed rates, type of feeds and type of crop inputs guide farming practices. 53 (18.9%) respondents agreed that type of breeds guide farming practices.

The study also examined the opinion of respondents on use of quality seeds and breeds. The results of analysis are presented in Table 4.13.

**Table 4.13: Opinion of Respondents on Use of Quality Seeds and Breeds**

		Total	SD	D	NT	A	SA	Mean	STD
Type of quality seeds used have increased crop yields	Freq.	97	10	41	54	106	69	3.65	1.109
	Perc.	100	3.6	14.6	19.3	37.9	24.6		
Types of feeds given to the animals have increased productivity	Freq.	97	19	23	55	104	79	3.72	1.159
	Perc.	100	6.8	8.2	19.6	37.1	28.2		
Types of breeds used have enhanced productivity	Freq.	97	14	33	59	123	51	3.59	1.071
	Perc.	100	5.0	11.8	21.1	43.9	18.2		
The type of crop inputs has increased productivity	Freq.	97	16	24	56	108	76	3.73	1.122
	Perc.	100	5.7	8.6	20.0	38.6	27.1		

The study found out that 51 (18.2%) respondents disagreed that type of quality seeds used have increased crop yields. 175 (62.5%) respondents agreed that type of quality seeds used have increased crop yields. It was generally agreed that type of quality seeds used have increased crop yields (mean = 3.65; STD = 1.109). The findings indicate that 42 (15.0%) respondents disagreed that types of feeds given to the animals have increased productivity. 183 (65.3%) respondents agreed that types of feeds given to the animals have increased productivity. There was consent that types of feeds given to the animals have increased productivity (mean = 3.72; STD = 1.159).

The researcher noted that 47 (16.8%) respondents disagreed that types of breeds used have enhanced productivity. 174 (62.1) respondents agreed that types of breeds used have enhanced productivity. The researcher established that there was general agreement that types of breeds used have enhanced productivity (mean = 3.59; STD = 1.071). It was established that 40 (14.3%) respondents disagreed that the type of crop inputs has increased productivity. 184 (65.7%) respondents agreed that the type of crop inputs has increased productivity. There was consent that the type of crop inputs has increased productivity (mean = 3.73; STD = 1.122).

## **CHAPTER FIVE**

### **SUMMARY, CONCLUSIONS AND RECOMMENDATIONS**

#### **5.1 Introduction**

In this chapter, the summary of key research findings, the conclusions drawn from the findings, recommendations and areas for further research are presented. The summary, conclusions and recommendations are in line with the objectives of the study.

#### **5.2 Summary**

This section outlines a summary of major findings of the study.

##### **5.2.1 Land Use Transition Strategy**

The study findings indicate that it was generally agreed that the number of animals stocked has increased productivity. The respondents were undecided on whether they intercrop in my farm which increases the crop yields or not. The researcher established that there was general agreement that the integration of animals and crop farming have enhanced productivity. There was general agreement that they practice horticulture crops which have increased income in the farm.

##### **5.2.2 Use of Modern Technology**

The researcher established that it was consented that the use of automated equipment's has increased productivity. It was generally agreed that the accessibility of internet/websites have enhanced yields. There was general agreement that the use of electric gadgets for decision making as enhanced productivity. It was consented that the use of automated machines has improved productivity.

##### **5.2.3 Use of Quality Seeds and Breeds**

The study found out that it was generally agreed that type of quality seeds used have increased crop yields. There was consent that types of feeds given to the animals

have increased productivity. The researcher established that there was general agreement that types of breeds used have enhanced productivity. There was consent that the type of crop inputs has increased productivity.

### **5.3 Conclusions**

Firstly, the study concludes that farmers have increased number of animals, done mixed farming and practiced horticulture in transitioning from subsistence to commercial farming.

Secondly, it is concluded that automation of equipment and machines, internet access and use of electronic gadgets enhances agricultural productivity in transitioning from subsistence to commercial farming.

Thirdly, the researcher concludes that the use of quality seeds and breeds increases productivity in transitioning from subsistence to commercial farming.

### **5.4 Recommendations**

Firstly, the study concludes that farmers should utilize their land economically in order to enhance productivity in farming.

Secondly, it is concluded that farmers should use modern technology enhances agricultural productivity in farming.

Thirdly, the researcher concludes that the use of quality seeds and breeds increases productivity in farming.

To future researchers and academicians, this study recommends that a study should be done in other regions to examine the effectiveness of strategies used by farmers in enhancing productivity.

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# APPENDICES

## Appendix I: Research Questionnaire

### **SECTION A: General questions on background information**

*Please answer the following questions either by ticking (✓) an appropriate box and/or providing additional information.*

1. State your gender: male [  ] female [  ]
2. How long has you been you have you been a small-scale farmer?  
Below 5 years [  ]      6 to 10 years [  ]      above 10 years [  ]
3. Indicate your level of education  
Primary [  ]      secondary [  ]      Certificate [  ]  
Diploma [  ]      Degree [  ]  
Post graduate [  ]
4. Which is your type of farming activity are you engaged with?  
.....
5. Indicate your approximate income level annually?  
Below 50,000 [  ]  
50,000-100,000 [  ]  
100,001-200,000 [  ]  
Above 200,000 [  ]

### **SECTION B: Land use transition strategy**

1. Indicate which practices in your farm do you practice?  
Zero grazing [  ]  
Mixed cropping [  ]  
Mixed farming [  ]  
Horticultural farming [  ]  
None [  ]  
Any other state.....
2. Applying to the key provided, please indicate your extent of agreement or disagreement to the following statements on land use transition strategy from subsistence to commercial farming. Tick in the appropriate box.

5 = Strongly Agree; 4= Agree; 3 = Undecided; 2 = Disagree; 1 = Strongly Disagree

Statements	5	4	3	2	1
The number of animals stocked has increased productivity					
I intercrop in my farm which increases the crop yields					
The integration of animals and crop farming have enhanced productivity					
I practice horticulture crops which have increased income in the farm					

3.What are the challenges facing your land use in the farm?

.....

**SECTION C: Use of modern technology**

1.Indicate which type of technology you are using in your farm?

Automated equipment [ ]

Use of the internet [ ]

Electronic gadgets [ ]

Automated machines [ ]

None [ ]

Any other state.....

2.Applying to the key provided, please indicate your extent of agreement or disagreement to the following statements: on the use of modern technology on transit from subsistence to commercial farming Tick in the appropriate box.

5 = Strongly Agree; 4= Agree; 3 = Undecided; 2 = Disagree; 1 = Strongly Disagree

Statements	5	4	3	2	1
The use of automated equipment's has increased productivity					
The accessibility of internet/websites have enhanced yields					
The use of electric gadgets for decision making as enhanced productivity					

The use of automated machines has improved productivity					
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3. What are the challenges facing use of modern technology in the farm?

.....

**SECTION D: Use of quality seeds and breeds**

1. Indicate which of the following guided your farming practices?

Types of breeds [ ]

Types of seed rates [ ]

Types of feeds [ ]

Type of crop inputs [ ]

None [ ]

Any other comment.....

2. Applying to the key provided, please indicate your extent of agreement or disagreement to the following statements on the use of quality seeds and breeds to transit from subsistence to commercial farming. Tick in the appropriate box. **5 = Strongly**

Agree; **4= Agree**; **3 = Undecided**; **2 = Disagree**; **1 = Strongly Disagree**

Statements	5	4	3	2	1
Type of quality seeds used have increased crop yields					
Types of feeds given to the animals have increased productivity					
Types of breeds used have enhanced productivity					
The type of crop inputs has increased productivity					

3. What are the challenges facing use of quality seeds and breeds in the farm?

.....

## Appendix II: The Work Plan

	February 2021		April –May 2021		June-September 2021		
Topic selection							
Proposal writing							
1 <sup>st</sup> Correction							
Defense							
Piloting							
Data collection							
Analysis							
Preparation of 1 <sup>st</sup> Draft							
2 <sup>nd</sup> Correction							
Final submission							
Defense							

## Appendix II: The Budget

ITEM	COST IN KSHS
Typing and printing	7,000
Photocopy	5,000
Writing materials	1,500
Pens and diskettes	500
Binding cost	3,000
Travelling	4, 000
To administer questionnaires	4,000
To consult supervisor	7,000
To pilot questionnaire	5,000
Accommodation and food (Field Work)	4,000
Subsistence allowance	15,000
Miscellaneous	1,000
<b>Total</b>	<b>57,000.00</b>