

**INFLUENCE OF SELECTED FACTORS ON MARKETING OF PYRETHRUM  
PRODUCTS OF SMALL HOLDER FARMERS IN KISII COUNTY, KENYA**

**BY**

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## DECLARATION AND RECOMMENDATION

### Declaration

I declare that this research project is my original work and has not been submitted for examination in this or any other institution.

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### Recommendation

This Research project has been submitted for examination with my approval as the University Supervisor.

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## **DEDICATION**

I dedicate this research project to Kenya Pyrethrum growers who despite the numerous challenges have persevered and continued to tender for the crop, eking a living from it, and educating many a children. Special dedication is to the following long time pyrethrum growers my father Mr. Francis Matonda Mirwoba, my late Mum Drusilla Moraa Matonda, my late Grandfather Mirwoba Matonda, and my late Grandmother Hanna Gesaka Kemunto Mirwoba. All these together contributed positively to enhance pyrethrum growing and used the proceeds to educate us. I dedicate this project to them in honor of their contribution.

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## ABSTRACT

Pyrethrum production, processing and marketing has been faced with many challenges, evidenced by Kenya losing the top position of global supplier of pyrethrum. Kenya used to control 70% of the global pyrethrum market share. However, the production, processing and marketing of pyrethrum flowers has dwindled in recent years. According to the Pyrethrum Board of Kenya, markets have been lost to other competing countries, while farmers are shifting to alternative crops. While past studies have demonstrated that there are many factors that influence marketing of agricultural produce, little focus has been made specifically on factors influencing marketing of pyrethrum from small holder farmers. This study therefore sought to examine the influence of selected factors on the marketing of pyrethrum products of small holder farmers in Kisii County. The specific objectives of the study were to establish the influence of quality related factors, competition related factors, farmers' cooperative societies and infrastructure related factors on the marketing of pyrethrum of small holder farmers. A correlational and cross sectional survey research design was adopted for the study. The target population was 950 pyrethrum farmers drawn from three pyrethrum growing constituencies of Kisii County. The farmers were members of Masaba Farmers' Cooperative Union, through their respective 12 Pyrethrum Farmers' Cooperative Societies (FCS). A sample of 274 farmers was picked proportionately from the three constituencies. The farmers' details were provided by the Masaba Farmers' Cooperative Union, and the sample was drawn from the 12 Farmers Co-operative Societies in 3 the pyrethrum growing constituencies in Kisii County. Research data was collected using questionnaires and the process took 3 months from June to August 2014. The questionnaire was administered to 274 pyrethrum farmers in Kisii County. Farmers were given the questionnaires by the FCS managers as they entered the FCS premises for their 2014 Annual General meetings. They were requested to fill and return the questionnaires to the managers the same day. This process was repeated in all the 12 FCSs on different dates. To summarize the data, descriptive statistics such as mean, frequencies and percentages were used. To test the hypotheses, Pearson's correlation analysis and multiple regression analysis were used. The results were presented using tables. The results revealed that there is a positive significant influence of the selected factors of quality related factors on marketing, competition related factors on marketing, farmers' cooperative societies on marketing and infrastructure related factors on marketing of pyrethrum products by smallholder farmers. The results also revealed that of the selected factors, infrastructure related factors had the most influence on marketing of pyrethrum followed by quality related factors, FCS, and competition related factors respectively. The findings further showed that quality related factors, competition related factors, FCS, and infrastructure related factors jointly have a positive significant influence on marketing of pyrethrum from smallholder farmers in Kisii County. The study recommended that in order to improve the marketing of pyrethrum from small holder farmers in Kisii County, the national and county governments and the Pyrethrum Directorate enhance pyrethrum quality to make it more competitive, revamp pyrethrum farmers' cooperative societies to improve marketing services to farmers, and improve infrastructure to ease logistics of pyrethrum products into the market. To scholars, the researcher recommended replication of the study in other pyrethrum growing counties to enhance understanding of factors that influence marketing of pyrethrum from smallholder farmers in Kenya.

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## **ABBREVIATIONS AND ACRONYMS**

<b>ADB</b>	African Development Bank
<b>AFC</b>	Agricultural Finance Corporation
<b>AFFA</b>	Agriculture, Fisheries and Food Authority
<b>CDA</b>	Crops Development Authority
<b>EPC</b>	Export Promotion Council
<b>EPZA</b>	Export Processing Zones Authority
<b>EU</b>	European Union
<b>FAO</b>	Food and Agriculture Organization
<b>FCS</b>	Farmers Cooperative Society
<b>GAP</b>	Good Agricultural Practices
<b>GoK</b>	Government of Kenya
<b>HVAF</b>	Higher Value Agricultural Food Products
<b>IFAD</b>	International Fund for Agricultural Development
<b>KENFAP</b>	Kenya National Federation of Agricultural Producers
<b>KENINVEST</b>	Kenya Investment Authority
<b>KCC</b>	Kenya Cooperative Creameries
<b>KCG</b>	Kisii County Government
<b>KMC</b>	Kenya Meat Commission
<b>KTDA</b>	Kenya Tea Development Authority
<b>MoA</b>	Ministry of Agriculture
<b>MRLs</b>	Minimum Residue Levels
<b>PBK</b>	Pyrethrum Board of Kenya
<b>PCK</b>	Processing Company of Kenya
<b>PGA</b>	Pyrethrum Growers Association
<b>PRA</b>	Pyrethrum Regulatory Authority
<b>SCDA</b>	Smallholder Crops Development Authority
<b>SHG</b>	Self Help Group
<b>UN</b>	United Nations
<b>BCC</b>	Board Collection Centres

## **CHAPTER ONE**

### **INTRODUCTION**

#### **1.1 Background of the Study**

A report on Kenya's pyrethrum industry by the Ministry of Finance, Planning and Economic Development, Government of Kenya (GOK MFPED, 2004) records a fluctuation in demand of pyrethrum extracts in Kenya, mainly due to fluctuation in demand in the world market and also due to increasing competition from inorganic products. Most of the channels available to the majority of pyrethrum farmers are long and inefficient causing delays in collection of dried flowers and in payment to farmers. Pyrethrum cultivation in Kenya dates back to 1928. The highest pyrethrum production in Kenya was realized in 1983 and from 1985 onwards, advanced technology in synthetic product innovation and aggressive promotion of the synthetic insecticides have discouraged increased production of natural pyrethrum not only in Kenya but worldwide. World pyrethrum production was about 14,000 tons of dried flowers, while demand was estimated at 20,000 tons per annum, International Fund for Agricultural Development (IFAD, 2004). This market gap encouraged the increased manufacture of chemical substitutes. According to the Export Processing Zones Authority of Kenya (2005) pyrethrum production had been on a steady rise from 1999 to 2002. However, production at current prices, declined from KSh 1,272 Million in 2002 to KSh 782 Million in 2003.

In the recent past, the performance of the pyrethrum sector has declined in terms of quality, price and production. For example in 2000, the pyrethrum bonus payment paid to farmers was 39% of the price of the crop, whereas in 2001, the bonus declined to 3% and as of 2002, no bonuses were paid. This is reported as one of the disincentives to pyrethrum farmers, making them not prioritize pyrethrum growing and marketing, Pyrethrum Board of Kenya, (PBK Annual Reports, 2010).

##### **1.1.1 Marketing of Pyrethrum**

The World Bank report (2007) identified Market access as one of the foremost factors influencing the performance of small-scale producers in developing countries. Smallholders' access to markets for higher-value or differentiated agricultural and food

products is recognized as a vital opportunity to enhance and diversify the livelihoods of lower-income farm households and reduce rural poverty more generally.

Recent studies have observed that the term agricultural marketing is composed of two words -agriculture and marketing. Agriculture, in the broadest sense means activities aimed at the use of natural resources for human welfare, and marketing connotes a series of activities involved in moving the goods from the point of production to the point of consumption. In principal therefore, the subject of agricultural marketing includes marketing functions, agencies, channels, efficiency, cost, market integration, and producer's surplus.

Pyrethrum marketing in Kenya value chain involves the pyrethrum farmer as the supplier of raw dry flowers, and the pyrethrum Board of Kenya as the main buyer and processor of the dry flowers delivered from the farmers. However, there are market channels such as the Farmers Cooperative Societies, the Buying Collection Centers, the Self Help Groups and the middlemen or brokers who buy from farmers and either deliver directly to PBK or through the group collection centers and farmer cooperatives. Upon processing the flowers to intermediate pyrethrum extracts and powders, buyers of these products from the PBK are the formulators. The formulators add more value to the pyrethrum powder, crude or pale extract from the PBK processing. Table 1.1 displays some preferred marketing channels from major pyrethrum growing regions.

**Table 1. 1: Preferred Marketing Channels Across Major Pyrethrum Growing Regions in Kenya**

Production region (County/Area)	Marketing channel	Variety planted	Pyrethrin content	Price per kg (Kshs)
Nyandarua /Kenton	SHG	P4	1.6	200.00
Nakuru/Kamara	SHG	P4	1.5	212.50
Nyandarua /Mawingu	BCC	Ndege	1.5	187.50
UasinGishu/Ainabkoi	SHG	Chui	1.4	175.00
Nakuru/Naivasha	PBK	Local	1.4	175.00
Nyandarua /Shamata	BCC	Katumani	1.3	162.50
Kisii/Ibacho	FCS	Nyamasibi	1.1	137.50
Kisii/Ramasha	FCS	Nyamasibi	1.1	137.50
Kisii/Keumbu	FCS	Nyamasibi	1.1	137.50

Source: Pyrethrum Board of Kenya (2010)

As shown in Table 1.1, preferred marketing channels for pyrethrum from smallholder farmers are farmers' clusters such as Self Help Groups, and Farmers' Cooperative Societies. From the table, it is apparent that in Kisii County, the Farmers Cooperative Societies stand out as the preferred channel of marketing pyrethrum. The table also depicts a trend in pyrethrin content, a factor of pyrethrum quality. It indicates that Kisii County pyrethrum flowers have the lowest content of 1.1 compared to pyrethrum from other regions whose pyrethrin content ranges from 1.3 to 1.6. Since payments are based on quantity in kilograms and quality in pyrethrin content, this clearly means that farmers from Kisii County earn low revenue for same quantity of pyrethrum as compared to the other regions. This is obvious in the column matching price for the pyrethrum from each region per kilogram. Kisii County pyrethrum farmers earned Ksh137.50 per kg of dry flowers while farmers from Nyandarua earned Ksh 200 per kilogram of dry flowers. The pyrethrin content is a reflection of the variety of pyrethrum grown, the geographical region as well as a host of other factors. However, from the table, it is clear that Kisii County farmers planted a local variety of

Nyamasibi, whereas Nyadarua farmers planted a high content hybrid of P4 variety (Kamau, 2016).

### **1.1.2 Selected Factors Influencing Marketing of Pyrethrum**

For the purposes of this study, four factors assumed to influence the marketing of pyrethrum from small holder farmers were selected. These are quality related factors, competition related factors, farmers' cooperative societies and infrastructure related factors. Recent studies on smallholder farmers suggest that their problems to access markets are many (Barham & Chitemi, 2009). The smallholder farmers' problems place farmers as price takers rather than price setters, mainly due to poor market access and consequent limited bargaining power. Further, literature suggests that perceived product quality is one of the eight dimensions that shape the quality concept. The others are performance, features, reliability, and conformance to specifications, durability, aesthetics, and serviceability. In a report by the World Food Programme (WFP, 2015) it is observed that although smallholder farmers produce most of the developing world's food, they also make up the majority of people living in poverty. Smallholder farmers are pivotal to addressing many of today's social, economic and environmental challenges. Many smallholders lack the equipment and knowledge they need to produce large quantities of quality crops, the report adds.

Given that pyrethrum is a natural insecticide from pyrethrum crop, its competition is both from products that serve the same function such as synthetic pyrethroids, and it can also be from other crops such as tea, coffee or food crops competing for the same land resources. Smallholder farmers make purchasing and consumption decisions, as well as production and marketing decisions regarding their farms. Choices include which crops to produce, which crops to sell, which crops to consume, how much livestock to raise, what food products to buy, what inputs to use, whether to work on or off the farm or both, as well as many more. When making important decisions, smallholders take into account a variety of factors, including but not limited to production costs, transportation costs, risk, revenue, prices, wage rates, and food security concerns (Fischer & Qaim, 2012).

For smallholder farmers to thrive in the global economy, it is necessary to shift from product-orientation to market-orientation interventions. Farmer groups such as Self Help Groups and Farmers' Cooperative Societies have been identified to play a key



role as an efficient mechanism for enhancing marketing performance (Kariuki, 2006) for smallholder farmers.

Transportation costs are especially relevant for farmers in developing countries, as they often have fewer roads on which to travel, and if they have paved roads, they are regularly in poor condition. Infrastructure is typically poor in rural areas limiting market access for agricultural produce. The farmers lose a large proportion of their harvest to rot and mould due to lack of storage facilities. Coupled with limited market information and poor transportation infrastructure, farmers generally sell to traders for low prices directly from their farms, leaving them with little income. Not only do better post-harvest handling practices and storage technologies allow farmers to retain more of their harvest, they also allow them to store their crops for longer periods, benefiting from sales for higher prices at a later time, the report adds (WFP, 2015)

### **1.1.3 Smallholder Issues in the Pyrethrum Sector**

Smallholder farmers are defined differently depending on the context, country and ecological zone. The term “smallholder farmer” is most often used interchangeably with “peasant farmer”, “resource poor farmer”, or “small scale farmer”. A typical smallholder farmer is a simple, small-based owner of a plot of land, growing food crops with a mix of some cash crops if any, but mainly utilizing family labour. In most cases, smallholder farmers’ production systems use outdated technology, realizing low returns with seasonal labour fluctuations. Women play a vital role in smallholder farming production. Smallholder farmers have to make decisions on farm allocations, resource distribution between food and cash crops, livestock and other on-farm activities (Gadzikwa, Lyne, & Hendriks, 2007).

Smallholder farmers contend with poor roads and high transportation costs. The farmers select crop activities based on cost, revenue and profit but are constrained by labor requirements, cash requirements, food security concerns, and input and output market access. Market access is directly related to distance to market, since distance to market increases the cost of inputs, increases transportation costs, and reduces the effective price farmers receive for outputs. In most parts of Africa including in Kenya, smallholder farmers are the engines of growth of their national economies.

In an effort to address the challenges facing the sector the Pyrethrum Act was reviewed in 2013. According to the Act every smallholder grower, for purposes of accessing economies of scale, shall have the freedom to register with a licensed pyrethrum processor, who shall keep for statistical purposes a register of all pyrethrum growers so registered. There is establishment an authority to be called Pyrethrum Regulatory Authority. The functions of the authority shall be to develop and promote the pyrethrum industry. It shall register processors, formulators and persons running pyrethrum nurseries. It shall also co-ordinate the activities of stakeholders and organizations within the pyrethrum industry. The principal objective of the Act was to liberalizing the market result and rewarding high quality and improved efficiencies. Despite all this efforts their impact has been minimal.

## **1.2 Statement of the Problem**

Marketing is important in identifying the customer needs, developing products to meet the needs, costing the product appropriately for affordability and profit while making the product available to the convenience of the customers. In marketing, quality related factors are exhibited in the product specifications. Important too is the understanding of the competition, both direct and indirect. This understanding of the competition helps position the product in the market through its unique selling proposition. To be able to make the product available to the customer, the channel of distribution is vital, and for smallholder farmers, group marketing is ideal in consolidating quantities, while observing quality requirements. Finally, the product has to be warehoused and transported, in its various forms to the customer; hence the importance of infrastructure in marketing of pyrethrum (Kotler & Keller, 2006).

Various studies focusing on factors affecting the performance of pyrethrum sector suggest that brokers dominate most pyrethrum marketing channels and charge for their services which reduce the famers' revenue. This is because the payments are determined by deducting these intermediate costs from the respective amount offered by PBK to farmers for flowers delivered. A further review of past studies suggests that there is little empirical knowledge about the factors influencing the marketing of pyrethrum products by small holder farmers.

Therefore, this study sought to examine the influence of selected factors related to quality, competition, farmers' cooperative societies and infrastructure on pyrethrum marketing by smallholder farmers in Kisii County.

### **1.3 Objectives of the Study**

The general objective of the study was to establish the influence of selected factors on marketing of pyrethrum products among small holder farmers. The specific objectives of the study were to:

- i. Establish the influence of quality related factors on marketing of pyrethrum products of smallholder farmers in Kisii County
- ii. Establish the influence of competition related factors on the marketing of pyrethrum products of smallholder farmers in Kisii County
- iii. Determine the influence of farmers' cooperative societies on the marketing of pyrethrum products of smallholder farmers in Kisii County
- iv. Determine the influence of infrastructure related factors on marketing of pyrethrum products of small holder farmers in Kisii County
- v. Determine the joint influence of quality related factors; competition related factors, farmers' cooperative societies, and infrastructure related factors on the marketing of pyrethrum of smallholder farmers in Kisii county.

### **1.4 Research Hypotheses**

This study sought to test the following hypotheses:

**H<sub>01</sub>:** There is no significant influence of quality related factors on marketing of pyrethrum products by smallholder farmers in Kisii County.

**H<sub>02</sub>:** There is no significant influence of competition related factors on marketing of pyrethrum products by smallholder farmers in Kisii County.

**H<sub>03</sub>:** There is no significant influence of farmers' cooperative societies on marketing of pyrethrum products by smallholder farmers in Kisii County

**H<sub>04</sub>:** There is no significant influence of infrastructure on marketing of pyrethrum products by smallholder farmers in Kisii County.

**H<sub>05</sub>:** Quality related factors, competition related factors, farmers' Cooperative societies, and infrastructure related factors jointly do not have a significant influence on marketing of pyrethrum products by smallholder farmers in Kisii County

### **1.5 Significance of the Study**

Globally, pyrethrum is viewed as an ideal pesticide in the current environmentally conscious climate. Kenya is well positioned to take advantage of this positive market trend. The study will benefit the Ministry of Agriculture in Kenya to adopt customized strategies in marketing the pyrethrum products. The findings will also assist the Pyrethrum Regulatory Authority as they endeavor to develop supportive policies to improve quality, competition, farmers' cooperative societies and infrastructure to enhance pyrethrum marketing. Since agriculture is a devolved function, this study will inform the 18 pyrethrum growing counties while making their County Integrated Development plans to prioritize pyrethrum as a cash crop. Infrastructure improvement is one major area of focus for the counties to facilitate transportation of flowers to the market, bringing sales revenue to the county governments.

Pyrethrum crop is an important cash crop since its introduction in Kenya in 1928. This study will enrich the scholars with knowledge and understanding of the influence of selected factors on the marketing of pyrethrum products of smallholder farmers in Kisii County. It will also stimulate further research for scholarly critiquing and for possible consideration of further studies to build a repository of knowledge on Kenya Pyrethrum.

### **1.6 Scope and Limitations of the Study**

This section presents the scope and limitations of the study.

#### **1.6.1 Scope of the Study**

This study sought to determine the influence of some selected factors on the marketing of pyrethrum of smallholder farmers from 12 pyrethrum farmers' cooperative societies of Masaba Farmers Cooperative Union in 3 constituencies of Kisii County. The study was conducted in March 2016 to December 2016.

#### **1.6.2 Limitations of the Study**

Pyrethrum is grown in 18 counties in Kenya, but the study focused on Kisii County, and in 3 constituencies within the County. This limits the generalization of the findings

across the country. There are many factors that influence marketing of smallholder agricultural produce. However, this study only focused on selected 4 factors, and there is room for further studies on many more factors not studied here.

### **1.7 Definition of Terms**

- Market Access:** The ease of entry into a market subject to the market's entry requirements
- Pyrethrin:** Pyrethrin is the active molecules in pyrethrum, with insecticidal properties
- Pyrethrin Content:** Also called pyrethrum content, is the amount of the active ingredient in pyrethrum which has the insecticidal properties
- Pyrethroids:** Pyrethroids are manmade insecticides that have a chemical composition which closely resembles Pyrethrin
- Smallholder Farmer:** This is a farmer practicing mixed farming on a small plot of land, in the study the average acreage being 6 acres.
- County:** A unit of devolved Government in Kenya as provided for in the Kenyan Constitution (2010). There are 47 counties in Kenya as at 2016.
- Quality:** The standard of Kenya pyrethrum as measured against customer specifications. It can also be considered as the degree of cleanliness, dryness and level of content of pyrethrum's active ingredient.
- Competition:** A situation in which every seller tries to get what other sellers are seeking at the same time
- Farmers' Cooperative Societies:** An autonomous association of farmers united voluntarily to meet their common economic, social, and cultural needs and aspirations through a jointly-owned and democratically-controlled enterprise
- Infrastructure:** Fundamental facilities and systems serving a country, city, or area. This may include the services and facilities necessary for its economy to function. For this study, infrastructure includes the road network, facilities for storing pyrethrum, vehicles to transport pyrethrum as well as the processing facilities amongst all other general facilities and services

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter reviews the theoretical perspectives of smallholder marketing, and delves in the past research relevant to this study. The study is founded on collective group marketing theories. The chapter further presents a model that links product factors to the marketing of smallholder pyrethrum products. It finally focuses on four selected factors likely to influence the marketing of pyrethrum products by smallholder farmers, presented in a conceptual framework at the end.

#### **2.2 Marketing of Agricultural Products**

Collective action has become an important strategy for smallholders in developing Countries to remain competitive in rapidly changing markets (Fischer & Qaim, 2012). Smallholder organization in farmer groups is seen as a possible institutional solution to overcome high transaction costs and other market failures in developing countries (Markelova, Meinzen, Hellin & Dohrn, 2009). Literature has examined determinants of group membership, focusing on farm and household characteristics, such as farm size, wealth, education, or gender (La Ferrara 2002; Bernard & Spielman 2009). This partly overlaps with studies on the impacts of group membership in terms of market access, prices, and income (Bernard et al. 2008; Narrod, Roy, Okello, Avendaño, Rich, & Thorat 2009). Another literature focus line has scrutinized structural and institutional aspects of farmer groups, such as group size, stringency of rules, commodity focus, and market conditions (Barham & Chitemi 2009; Narrod et al., 2009). Yet, one aspect that has hardly been analyzed empirically is the intensity of participation of individual members in different group activities. This is considered a research gap, which was addressed in an article by (Fischer, & Qaim, 2010).

Tegemeo Institute of Agricultural Policy and Development is a Policy Research Institute of Egerton University that conducts research and analysis on policy in the domain of Agriculture, rural development, natural resources and environment. Tegemeo Agricultural Monitoring and Policy Analysis Project, Kenya found out that pyrethrum in Kisii faces stiff competition from other agricultural enterprises such as horticulture and dairy which earn higher returns.

Sustainable agricultural development requires proper coordination of production, processing, distribution and marketing functions in harmony with natural resource systems. The success of these processes greatly depends on existence of effective institutions that are able to respond to both local and global changes in the commodity markets, as well as in the policy frameworks (ADB, 2005). Livelihood improvement from commercial agriculture also varies considerably with the level of stakeholder participation in decision-making (FAO, 2002). National statistics (Republic of Kenya, 2005a) indicate that pyrethrum would provide more robust income throughout the cropping year unlike seasonal crops. Distortions in policy environment and markets have been cited in some previous studies as key constraints to the pyrethrum industry in Kenya (IFAD 2004; Republic of Kenya, 2004b). However, no attempts have been made to rank the constraints, and this makes it difficult to prioritize solutions for policy action given scarce resources. These studies also highlighted stiff competition resulting from synthetics and imports of processed pyrethrum products, as well as challenges of tight international trade requirements, but failed to suggest coherent mechanisms for addressing the impediments.

Hundreds of millions of smallholder farmers in developing countries face serious obstacles in advancing from subsistence farming to higher-value-income pathways. Barrett (2008) outline the prospects of smallholder farmers and Chapoto et al. (2013) provide detailed scenario options for smallholder farmers. They also offer sobering analyses that highlight the scale of the problems faced by smallholders and the generational timeframe it takes for even a few to escape rural poverty through farming. These studies stress that market linkage is not a panacea. Most smallholder farmers are unlikely to ever shift to high-income pathways. Extension services must be flexible to meet the needs of these different types of farmers. These authors conclude that there are numerous factors that affect farmers' prospects in the value chain and with establishing market linkages. These factors include location and business maturity within a target area, as well as access to infrastructure, agricultural services, and water and production technologies. The skills, education, and organization of the farming community are also important aspects in terms of their ambitions, discipline, and ability to plan, set goals, and follow an implementation schedule. It is important to consider these factors when deciding whether to invest in a particular area to ensure that project designs improve market linkage prospects.

In a strategic paper to develop cooperatives societies in South Africa, it is revealed that there are many constraints faced by smallholder farmers, (Republic of South Africa, 2012). The strategy reveals the lack of access to land, lack of reliable markets for their produce, non-value addition to their products, lack of human capital, high transaction costs, declining agricultural productivity, inability to modernize due to limited land sizes, limited market access, increasingly costly market regulations, poor physical and institutional infrastructure are some of the constraints. High transaction cost and lack of proper roads in the remote rural areas limit the ability of a farmer to transport inputs, products to the market. Ultimately, lack of reliable markets is a major constraint bedeviling the smallholder farmers. Farmers are forced to sell their products at the farm gate, fetching very poor prices.

Markets cannot be known to exist if there is no access to information about their existence, and their product requirements. Therefore, lack of access to market information, and market channels favoring market access is a key hindrance to market access by the smallholder farmers. Human capital lacks in many smallholder farms, and affordability of the available skilled services is not within the reach of the farmers. There is increasing global consumer demands on food, health and safety. This makes it difficult for smallholder farmers to enter high-value markets in light of low quantity and poor quality of their products. Smallholder farmers are inconsistent in their production, with seasonal varying quantities and quality. This makes them unreliable suppliers, hence are not preferred by buyers. This also reduces their bargaining power, leading to poor prices for their products. Information is key to inform and to help make decisions. However, for smallholder farmers, lack of access to timely, accurate market information robs them of the advantage to locate the best markets, and prevents them from selling at peak market prices.

### **2.3 Product Quality and Smallholder Marketing**

The concept of Good Agricultural Practices (GAP) has evolved in recent years in the context of a rapidly changing and globalized agricultural economy. This is mainly a result of the concerns and commitments of a wide range of stakeholders to balance agricultural production and security with agricultural safety and quality and environmental sustainability of agriculture. The Food and Agricultural Organization (FAO) with a number of stakeholders developed a conceptual framework for Good



Agricultural Practices. Broadly defined, the GAP applies to recommendations and available knowledge to addressing environmental, economic and social sustainability for on-farm production and post-production processes resulting in safe and health food and non-food agricultural products.

In Kenya the Pyrethrum Act 2013 gives the Pyrethrum Regulatory Authority the powers to set the required pyrethrum standards. PBK products are registered in USA, Canada, European countries, Japan, Australia, India, and in some countries in Africa. Major data packages have been generated for registration and regulatory authorities that include; the European Biocide Directive, European Drug Master File, United States Environmental Protection Agency (USA-EPA), United States Food & Drugs Agency (USA-FDA), European Agricultural Directive (91/414/EEC), International Co-operation on Harmonisation of Technical Requirements for Registration of Veterinary Products, International Federation of Organic Agriculture Movement, and the Soil Association. All these bodies measure and approve pyrethrum products quality.

All flower deliveries from the fields are inspected for quality, weighed, sampled and analyzed for Pyrethrin content at the former Pyrethrum Board of Kenya laboratories. They are then stored under carbon dioxide or directly passed to the various processing stages according to requirements, e.g. manufacture of powders or extracts. Every stage of processing undergoes a rigid control system. All factory inputs are routinely analyzed for conformity with specifications. In-process control employs methods of analysis such as Gas Liquid Chromatography, Thin Layer Chromatography, Ultra Violet and Infra-Red Spectrometry as well as the High Performance Liquid Chromatography (HPLC). Before release to a customer the former PBK laboratories inspect all products by use of state-of-the-art analytical methods. Each shipment is accompanied by an Analysis Certificate to testify compliance of the product with its specification as well as regulations of the receiving country or its specific use. Policies that strengthen property rights and institutional management structures and capacities would provide incentives for beneficial participation by farmers and other stakeholders in the pyrethrum value chain. Effective targeting of pyrethrum products to niche markets, competitive pricing, reduced transportation costs and mitigation of post-harvest losses also contribute to improved enterprise performance (WBCSD, 2004).

Quality is regarded by most producers as one of the most important aspects of manufacturing, service and purchasing strategies. Several studies, for example, Aaker and Jacobson (1994), Buzzell, D., Gale, T. & Sultan, R. G. M., (1975), Capon, N., Farley, U. & Hoenig, S., (1990), and Anderson (1992), have reported that perceived product quality is related to increased sales and profits and consumers make their purchase decisions in relation to perceived quality. These studies show that perceived product quality is one of eight dimensions that shape the quality concept, the others are: performance, features, reliability, conformance, durability, aesthetics and serviceability (the intrinsic attributes or physical characteristics of a product).

Expanded pyrethrum production will increase growers' earnings despite of the problem of low producer prices that strongly militate against the production and marketing of good quality pyrethrum. Pyrethrum farmers are paid based on the quality of their dry flowers and especially on the pyrethrins content (PBK, Appendix IV). The pyrethrins content is a factor of variety / clone of pyrethrum grown, the geographical conditions, crop husbandry including harvesting, drying, storage and delivery lead times. Since pyrethrins breaks down in sunlight and on exposure to ultra violet light, long storage periods lead to low pyrethrins content, and hence low payments to farmers (PBK manual). There is wide acceptance of diversified uses of pyrethrum products, such as their application as herbicides and stabilizers (Jovetics, 1994). The environmental-friendly nature of pyrethrum also makes it quite useful as a critical component in most pesticide formulations worldwide.

Strategies of accessing emerging export market opportunities (especially in Asia) have also not featured in previous studies. Value addition provides a good option for diversifying use of pyrethrum products and raising farm incomes. Indeed, aggressive processing of primary commodities for export markets contributes significantly to employment creation, increased raw material production, improved investment in infrastructure development and increased export value, especially in the Newly Industrialized Countries such as Malaysia and Thailand (Ganewatta et al., 2005).

Kenya exports 97 percent of its pyrethrum products as crude or refined pyrethrin while only 1 percent is processed for use in the domestic market (EPZA (2005)). There is, therefore, a wide scope for adding value to locally produced pyrethrum. One of the key determinants of the value of pyrethrum is its pyrethrin content, which is affected by the

type of seedlings planted, crop husbandry and processing practices. Some studies have noted failures in Kenya's pyrethrum institutions and expressed the need to reform those institutions. However, no clear reform path that fully incorporates all stakeholders' views is suggested by these studies. For instance, the IFAD (2004) study recommended replacement of the government-run PBK with a private company, the Pyrethrum Company of Kenya (PCK), but failed to indicate the best method of constituting the PCK and the desired stakeholder representation. Another study on Kenya's pyrethrum sub-sector (Kariuki, 2006) suggests the need for enhanced value addition and institutional governance, but largely ignores the role of farmers in these essential value chain transformation processes. The foregoing gaps in literature present a daunting task in regaining the competitiveness of Kenya's pyrethrum industry, more so toward sustainable development. This study sought to address some of these challenges, with the aim of improving smallholder stakeholder participation in pyrethrum products marketing, and ensuring a stable future for the country's pyrethrum sub-sector.

#### **2.4 Competition and Smallholder Marketing**

According to the Institute of Economic Affairs, IEA (2001), Pyrethrum was first introduced in Kenya in 1928 from Europe and, by 1933, the first commercial crop was exported mainly to Europe (Contant, 1979). Kenya pyrethrum was of high-quality and hence quickly replaced the Japanese pyrethrum on the world market by 1941. At its peak, Kenya was the largest single producer of pyrethrum in the world accounting for over 70 per cent of the world market. Other producer countries are Tanzania, Uganda, Rwanda, Ecuador, Papua New Guinea and lately Tasmania in Australia. Recent studies further observe that Pyrethrum is an expensive insecticide, so it is not surprising that the chemical industry has attempted to develop synthetic equivalents Pyrethroids are manmade insecticides that have a chemical composition which closely resembles Pyrethrin.

In the fight for market share, competition is not manifested only in the other players. Rather, competition in an industry is rooted in its underlying economics, and competitive forces that go well beyond the established combatants in a particular industry. Porter (1997) identifies customers, suppliers, potential entrants, and substitute products as competitors that may be more or less prominent or active depending on the industry. New entrants to an industry bring new capacity, the desire to gain market

share, and often substantial resources. Companies diversifying through acquisition into the industry from other markets often leverage their resources to cause a shake-up, as Philip Morris did with Miller beer.

Porter (1997) further explains the seriousness of the threat of entry. This depends on the barriers present and on the reaction from existing competitors that entrants can expect. If barriers to entry are high and newcomers can expect sharp retaliation from the entrenched competitors, obviously the newcomers will not pose a serious threat of entering. Initially, ground pyrethrum flowers were used as a raw material input for making mosquito coils and powdered insecticides and resulted in a limited customer base. Success in the extraction and refining of purified pyrethrins from the flower gave this natural insecticide much broader applications, such as water-based aerosols that SC Johnson pioneered. According to Abbot (1988), there has been increasingly greater recognition of the value of natural pyrethrum and pyrethrins for use in household insecticide products. The US is the single biggest market today, and only major American buyers of purified extract remain, most of which are distributors who purchase from the former PBK and later resell to manufacturers.

During periods of shortage, some pyrethrum consuming companies shifted supplies, in full or in part, to synthetic pyrethroids to reduce their supply risk and save costs. The insecticide market has been consuming approximately 60 percent synthetic Pyrethroids and 40 percent natural pyrethrins (PBK, 2014).

## **2.5 Farmers' Cooperative Societies and Smallholder Marketing**

Hudson and Herndon (2002) introduce a farmer cooperative as a business organization owned and controlled by its members for their mutual benefit. Members finance their cooperative through equity investments. Control comes via membership rights to vote for and become directors. The directors hire the manager and establish the policy under which the manager operates. While the manager and directors have little direct control over the external environment, they do have control over and the responsibility for how the cooperative adjusts to a continuously changing world environment.

Quint (2014) also observes that while many cooperatives may have struggled and disappeared, others have recast themselves in order to cope better with the changes in

global markets. Cooperatives and rural associations are now resurgent business forms in Africa. It is once again accepted that farmer organizations offer a way to exploit the potential of collective action in order to access markets more effectively, to take advantage of organizational opportunities to overcome financial cash and investment constraints, and information asymmetries, and to exploit scale economies in production and marketing. Thurston (1984), noted that the potential therefore for farmer associations to improve the livelihoods of the rural population and contribute to a decrease in poverty may well depend on a new generation of dynamic and alternative forms of commercial organization.

A smallholder farmers' association is made up of cooperatives or farmer field schools or farmer producer marketing groups (FAO, 2001). These common groups are created and financed by farmer members to provide them with services that help improve their economic and social conditions (Gatarwa & Place, 2005). An association is a form of collective action; the farmer groups undertake a voluntary action to achieve a common interest (Meizen-Dick, 2004). Collective action typically arises in instances where there are significant incentives to cooperate (Van Heck, 2003).

The British Colonial Authorities launched a major agricultural development initiative which laid the foundation of Kenya's post-independence agricultural prosperity. This initiative known as the Swynnerton Plan was implemented between 1954 and 1963 and was the largest small holder development programme ever implemented by the Colonial Authorities in Africa. It was anchored on intensification of agricultural production in the Central and Rift Valley Provinces coupled with the establishment of an effective and efficient post-harvest processing and marketing infrastructure. Infrastructure includes both physical infrastructures such as rural roads, markets; warehouses and processing factories as well as institutional infrastructure such as the Small-holder Crop Development Authority [SCDA]. The SCDA evolved into the Kenya Tea Development Authority [KTDA] which was regarded in the 1960s as the most successful integrated institutional innovation for agricultural development.

The CDAs for Cotton; Coffee; Tea; Dairy; Livestock, Sisal; Pyrethrum, and Tobacco were established to handle input supply as well as output marketing and processing. Limited support services from extension providers has been observed, leading to the promotion and development of farmers' cooperative societies (FCS), to reduce poverty,

unemployment, and high levels of inequality. FCSs are known to address the smallholder farmers' constraints. Smallholder FCS aims to attain improved sustainability and scope of products offered through creation of economies of scale; improved logistics in terms of storage and transportation facilities; Assist in ensuring compliance with food safety and quality assurance standards; Improved market intelligence; Improved bargaining power to ensure fair trade; Lowering of transaction costs as a result of bulk buying; Improved access to best available technology to improve production efficiencies and quality of products; and Ensure that there are value adding and agro-processing facilities.

Monda (2014) observes that the Pyrethrum Growers Association of Kenya (PGA) is a Business Membership Organisation registered under the Societies Act with its headquarters in Molo. It was established in 2001 to represent the interests of the small scale pyrethrum growers. The formation of PGA was initiated by the pyrethrum growers prompted by the decline in pyrethrum production and a desire for farmers to voice their problems and grievances to the government and other stakeholders. Pyrethrum growers in Kisii belong to cooperative societies, and the Masaba Farmers' Cooperative Union through which marketing of pyrethrum is conducted. The collection centers which are managed by the cooperatives serve as consolidation and holding centers. Payments to farmers are also channeled through the cooperatives (PBK, 2014).

## **2.6 Infrastructure and Smallholder Marketing**

Kenyan traders in agricultural produce face high transportation and other transaction costs due to poor roads and other market inefficiencies. These costs have been shown to influence the agricultural sector as they influence the difference between farm gate prices and retail prices in the final consumer market – the marketing margin. Marketing margins influence farm gate prices of farm inputs and the retail prices of farm produce. As such, they are major determinants of the competitiveness of produce and products in domestic as well as international markets, access to inputs, household incomes, expenditure and access to food. Efficiency and cost reduction in marketing of agricultural produce is of paramount importance to the success or survival of the agricultural sector. The marketing channel adopted and also external factors outside the area of influence of those involved in marketing influences the magnitude of marketing costs.

Cooperatives face many problems and issues, both internally and externally. Cooperatives generate nearly Ksh11.050 trillion in revenue and offer 200,000 jobs (Deller et al., 2009). Cooperatives operate under a business model that generates unique challenges in financial management, governance, strategy and communication. The fact that agricultural cooperatives are governed by producer members is both a key strength and a key challenge for cooperatives. Hueth and Reynolds (2009) summarize the issues and need for future research in this area. The key governance challenge is that of identifying and recruiting directors with the essential mix of skills. Member involvement in a cooperative is another key issue which often relates to their access to board members or interest in running for the board. Other governance issues identified by the panel were related to the effectiveness and performance of the board of directors. The addition of outside, non-member directors has been a recent development in agricultural cooperatives, and according to the panel, is an important issue facing modern cooperatives.

The local traditional market is usually maintained in areas where transportation is almost impossible for the rural population with its limited means. And the goods and services are intended for local consumption. The local market is usually located in a market place. This is a site in which the goods offered change from season to season. Such local markets form a network, in which one market is linked to another through the passage of goods, services and people. The local market is a meeting place of occasional sellers, who set up at random in sales shacks, and come together at fixed time intervals at that fixed site. This is where goods and services are distributed between the villagers, who act both as buyers and sellers.

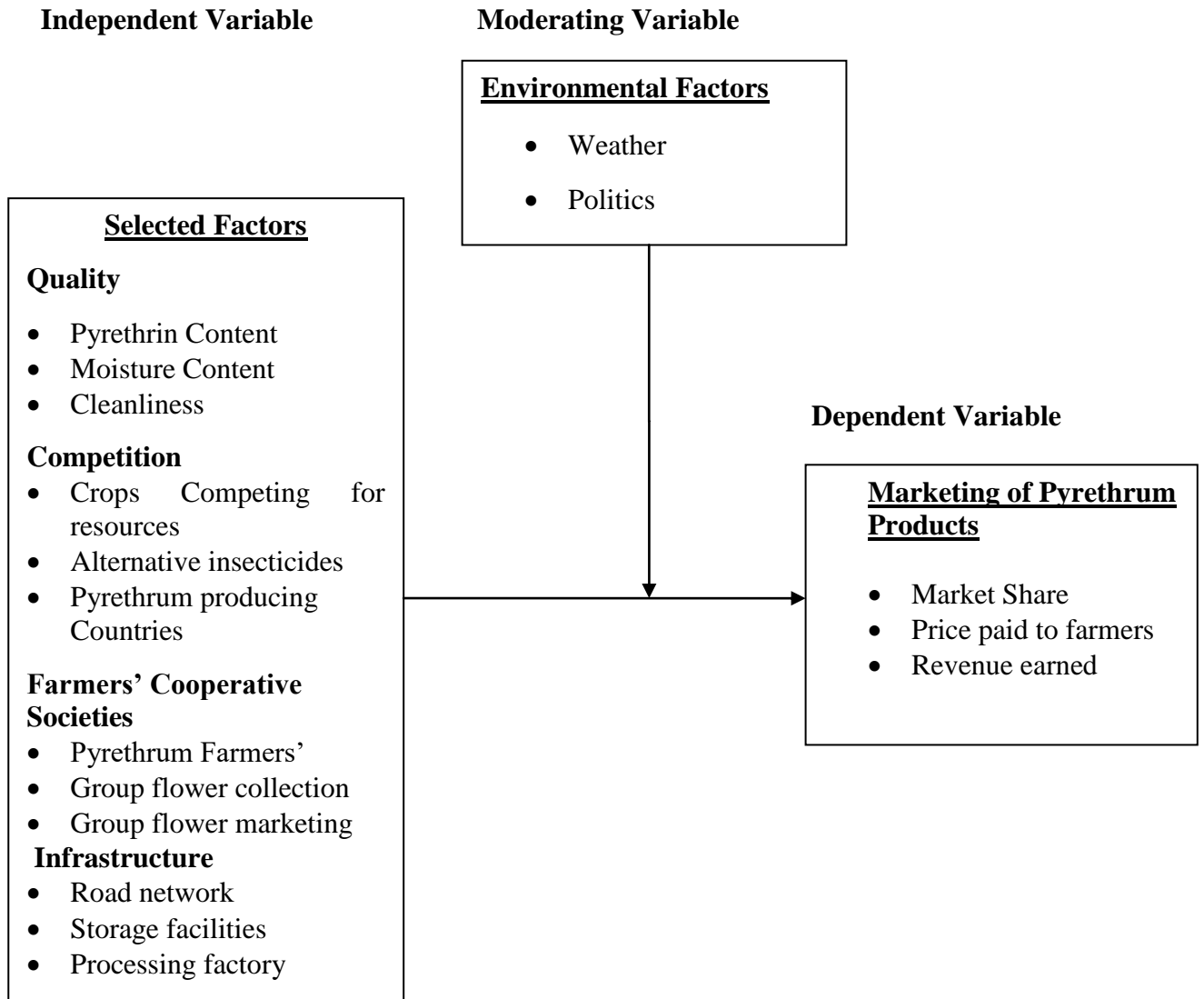
Literature records that the ability of the cooperative to transport its produce on its own is generally considered a great advantage. The cooperative can choose the most suitable means of transportation, the transportation capacity employed as well as the direction of transportation according to its needs and capabilities. Many cooperatives in developing countries assume that the development of the transportation function within the cooperative framework means that the cooperative must purchase the vehicles, but this is incorrect. It turns out that the purchase of a truck by the cooperative is done without conducting the necessary economical examination. It is generally the case that the truck capacity is not put to full use most of the year,

except at harvest time. And then it is often insufficient. An additional problem is truck maintenance. In most cases the cooperative hires a driver, and such drivers receive a very low pay in most countries of the world. Thus it is important to note the significant role that infrastructure plays in the facilitation of products movement to the consumers. Due to the biodegradable characteristic of pyrethrins, delays in delivery of dry flowers to PBK exposes the flowers to degradation and a drop in pyrethrins content. This directly reduces the farmers' earnings which are based on pyrethrins content. This delay in delivery of flowers to PBK eventually affects the processing schedules which in turn cause unreliable customer supplies (PBK).



## 2.7 Conceptual Framework

In this study, the dependent variable is marketing of pyrethrum products and the independent variable is Selected Factors of Quality related factors, Competition related factors, Farmers Cooperative Societies and Infrastructure related factors. The variables and how they are related is shown in Figure 2.1.



**Figure 2.1: Relationship between Quality, Competition, Farmers Cooperative Societies, and Infrastructure related factors and Marketing**

Quality of pyrethrum products is mainly measured with by the pyrethrin content, moisture content and cleanliness Pyrethrum is paid based on the pyrethrin content and quantity of the product. Competition is perceived to be faced from alternative products replacing pyrethrum as an insecticide, other pyrethrum growing countries which fight

for the same global market share for pyrethrum, and crops being grown instead of pyrethrum. The Farmers cooperative societies are an important channel for marketing of produce from small holder farmers. This is mainly for ease of collecting and consolidating quantities enough for bulk transportation and collective marketing. In this study Infrastructure focuses on road network and storage facilities. This is all aimed at establishing that pyrethrum does not lose its pyrethrin content before reaching the market for processing, because pyrethrum disintegrates readily on exposure to sunlight, and water.

The four selected variables of quality, competition, farmers' cooperatives societies and infrastructure are expected to influence marketing of pyrethrum products since pyrethrum quality depends on crop husbandry. For instance, if pyrethrum is intercropped with other nutrient and space competing crops, the quality of the flowers is bound to deteriorate. On the other hand, smallholder crops need to be consolidated in order to pool enough volumes or quantities to attract a sustainable market. Therefore, farmers' cooperative societies (FCS) play the role of consolidation whereas infrastructure maintains the quality of the products, while in warehouses or on transit to the market. It is expected that all the four selected factors play a complementary function in regards to marketing of pyrethrum products from small holder farmers. However, the influence of the selected factors on marketing is expected to be moderated by environmental factors such as weather and politics. Overall, it is expected that all the four selected factors jointly influence the marketing of pyrethrum products; however, the degree of influence of each factor will be established.

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

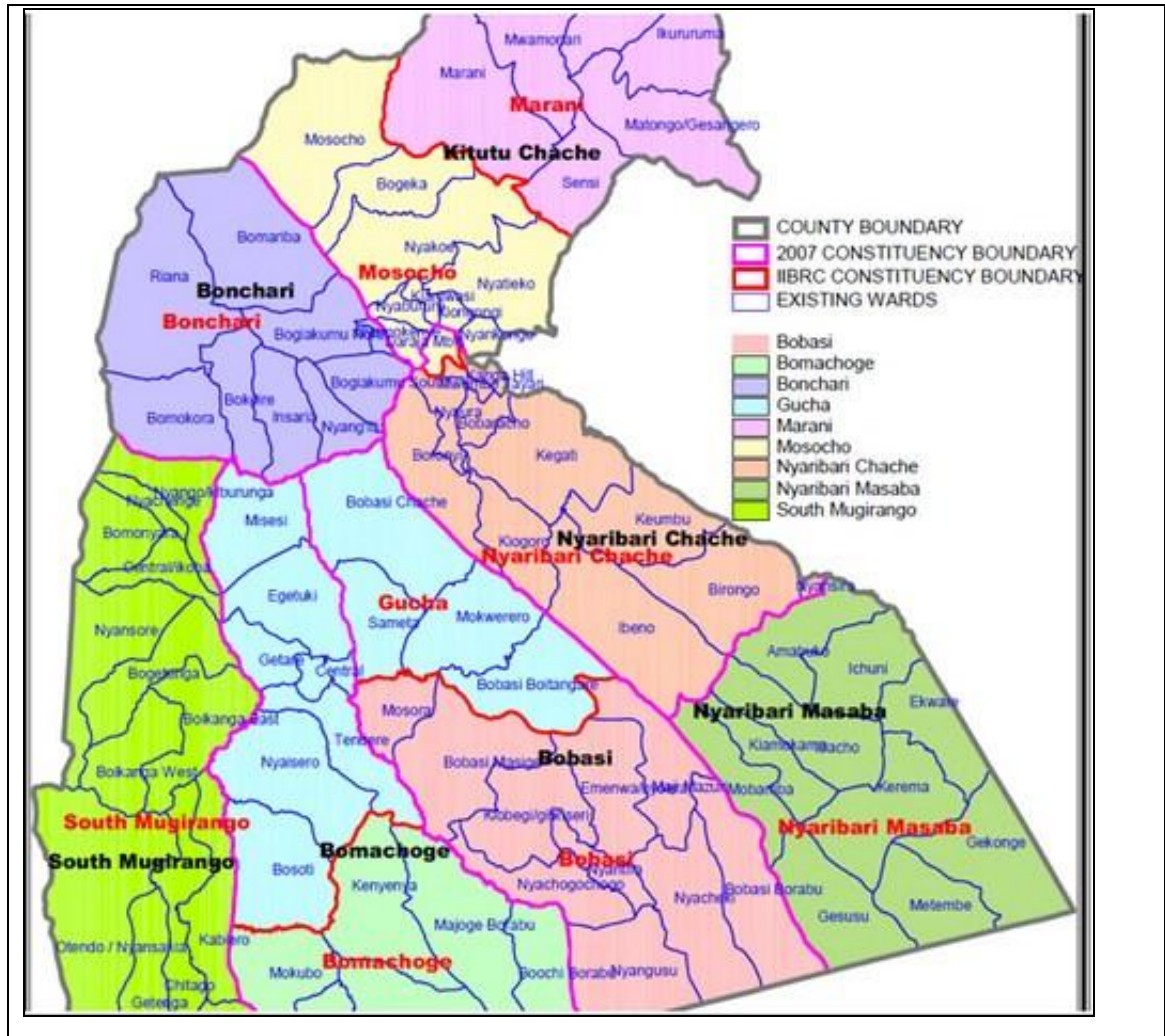
This chapter gives information on the research design adopted, the target population studied, the sample size used, data collection methods employed and data analysis techniques or tools used to organize and analyze the data.

#### **3.2 Research Design**

This study adopted a correlational and cross-sectional survey research design to examine the influence of individual dependent variables of quality related factors, competition related factors, farmers' cooperative societies and infrastructure related on the independent variable of marketing of pyrethrum by smallholder farmers in Kisii County. By adopting the correlation and cross-sectional survey research design data was collected over a short period of time across the sample elements. The survey was limited to eliciting views from the pyrethrum farmers about the influence of the selected factors on the marketing of their pyrethrum.

#### **3.3 Area of Study**

Kisii County is located in western Kenya and it has 9 administrative constituencies as shown in Figure 3.1. It has a population of 1,152,282 as per the 2009 census, 245,029 households and covers an area of 1,317.4 sq km. The population density stands at 874.7 people per sq. km and 51% of the population lives below the poverty line. The growth of cash crops such as tea, coffee, pyrethrum and subsistence crops such as maize, beans and potatoes are supported by the red volcanic soils.



**Figure 3. 1: Map of Kisii County**  
 (Source - Kisii County Government, 2014)

From Figure 3.1, the three pyrethrum growing constituencies of Nyaribari Masaba, Nyaribari Chache and Bobasi are shown. These constituencies neighbor each other and are of higher altitude than the rest. All the 12 pyrethrum Farmers Cooperative Societies are within these three constituencies.

### 3.4 Target Population

The population of the study comprises of pyrethrum farmers in Kisii County, who are also members of the 12 Farmers Cooperative Societies in the County. These cooperative societies together with 17 others from Nyamira County form the Masaba Farmers Cooperative Union. The target population therefore was drawn from 950 farmers as received from a farmers’ register at Masaba Farmers Cooperative Union.

The population was drawn from members of the twelve (12) pyrethrum Farmers' Cooperative Societies in the three constituencies of Kisii County. The 12 FCSs in Kisii County are shown in Table 3.1.

**Table 3. 1: Pyrethrum Farmers Cooperative Societies in Kisii County**

FCS	FCS	FCS	FCS
Gesusu	Ibacho	Nyangusu	Nyachekei
Masimba	Nyamasibi	Kiobegi	Majimazuri
Kiamokama	Ramasha	Nyamache	Nyanturago

Source: Masaba Farmers' Cooperative Union, 2014

The list of pyrethrum farmers from the 12 FCS was provided by the Masaba Farmers' Cooperative Union.

### 3.5 Sample Design

A sample of pyrethrum farmers was used for the study. According to Mugenda and Mugenda (1999) a researcher is advised to take as big a sample as possible if he has adequate time for the study - to ensure that someone else would get similar findings to a high degree if he selected another sample of the same size. Strauss and Corbin (1998) suggest that 10% of the accessible population would suffice for a descriptive study if the population units are more than 30. However, this study used the Krejcie and Morgan (1992) Table to get the sample size for the study. From the Krejcie and Morgan Table (Appendix III), a population of 950 will require that we use a sample size of 274. Therefore, the sample of 274 respondents was randomly picked from the provided registers of the various cooperative societies in the 3 pyrethrum growing constituencies. The sample population was further stratified into subpopulations based on constituencies, using proportionate sampling depending on the number of farmers in each constituency. Respondents were drawn from each of these subpopulations as shown in Table 3.2.

**Table 3. 2: Population and Sample by Constituency**

<b>Constituency</b>	<b>Population</b>	<b>Sample</b>
Nyaribari Masaba	402	116
Nyaribari Chache	323	93
Bobasi	225	65
<b>TOTAL</b>	<b>950</b>	<b>274</b>

Source: Masaba Farmers' Cooperative Union, 2014

### **3.6 Data Collection**

The study used primary data, which comprises original data gathered by the researcher for the specific purpose of the study at hand (Mugenda & Mugenda, 1999). Data was obtained through questionnaires administered by the researcher. The questionnaires contained specific questions aimed at collecting factual information about the influence of the selected factors on marketing of pyrethrum by small holder farmers in Kisii County. This was in line with the study objectives. The questionnaires were administered by the FCS managers during farmers' meetings in the FCS premises. The questionnaires were issued to farmers as they walked in through the gate. The farmers were asked to fill the questionnaires and then they were collected back by the managers. The researcher picked the filled in questionnaires from the FCS managers immediately after the meetings. The use of questionnaires was justified because it was the most affordable way, and most convenient instrument to collect data from the respondents. The unit of analysis was the farmer and data was collected from individual farmers from each FCS in Kisii County.

### **3.7 Measurement of Variables**

In this study, the independent variables are quality related factors, competition related factors, farmers' cooperative societies and infrastructure related factors. The various variables were measured against their influence on marketing, by asking respondents questions linking the variables to marketing. For instance, Quality was measured by asking farmers whether they are paid based on the dryness, cleanliness and pyrethrins content of their flowers. Competition was measured by collecting information such as

the various types of crops grown by the same farmers. Farmers' Cooperative Societies' influence on marketing of pyrethrum products was measured by responses on the preferential marketing channel chosen by the farmer while Infrastructure was measured by factors such as storage facilities, road network conditions and questions on pyrethrum processing facilities. A five point Likert Scale ranging from strongly disagree (1), disagree (2), neutral (3), agree (4) and strongly agree (5) was used. Other parameters which required a yes or no answer used a scale of (0) for no, and (1) for yes.

### **3.8 Validity and Reliability**

#### **3.8.1 Validity**

According to Mugenda and Mugenda, (2003) validity is the accuracy and meaningfulness of inferences, based on the research results. If research data is a true reflection of the variables, then the inferences based on such data was accurate and meaningful. To ascertain the validity, the researcher used content validity through supervisor assistance. Inappropriate and unsystematic procedure in questionnaire development, testing and evaluation may undermine the quality and utilization of data. Construct validity of the instrument was obtained through the development of the scales in consultation with the supervisor.

#### **3.8.2 Reliability**

Reliability is the extent to which a measurement is random error-free and produces the same results on repeated trials. It also refers to consistency of scores obtained by the same test on different occasions, or with different sets of equivalent times or under other variables examining conditions. Reliability according to Mugenda and Mugenda (1999) tests whether the research instrument will be relied upon in obtaining the required information from the respondents. This was done by piloting the questionnaires to 28 farmers, who are members of pyrethrum farmers' cooperative societies in Kericho County.

Cronbach reliability coefficient was used to ascertain the reliability of factors extracted from the Likert scale in the questionnaire because it determines the internal consistency or average correlation in a survey instrument. Cronbach alpha is a coefficient of internal consistency used as an estimate of reliability and it ranges in values from 0-1. If the values exceed the standard of 0.7 then the reliability of the model was considered

accurate enough (Nunnaly, 1978). The results for the overall reliability for the cumulative items are presented in Table 3.3.

**Table 3. 3: Reliability Statistics**

Number of Items	Cronbach's Alpha ( $\alpha$ )
28	0.781

The results indicate that the overall Cronbach alpha coefficient is above the threshold of 0.7 hence the instrument was considered reliable.

### **3.9 Data Analysis and Presentation**

Data analysis consists of examination, categorization, and tabulation of the evidence to address the initial propositions of the study (Kothari, 2009). Once data was collected it was edited to eliminate errors and improve its quality, coding followed before a detailed analysis using the Statistical Package for Social Sciences was done. Coding is defined as the analytical process through which “data are fractured, conceptualized and integrated to form theory” (Strauss & Corbin, 1998). Both qualitative and quantitative techniques were used to analyse the data. Data was analysed by use of descriptive statistics (mean, standard deviation, variance and percentage). Pearson correlation coefficient was used to test hypotheses ( $H_{01}$  to  $H_{04}$ ). Multiple regression model was used to test hypothesis  $H_{05}$ . The following model was used:

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

Where: Y = Marketing of Pyrethrum Products

a = constant;

$X_1$  = Quality related factors;

$X_2$  = Competition related factors;

$X_3$  = Farmers' Cooperative Societies;

$X_4$  = Infrastructure related factors

$\beta_1$  to  $\beta_4$  = regression coefficients;

$\varepsilon$  = error term



## CHAPTER FOUR

### DATA ANALYSIS AND INTERPRETATION OF RESULTS

#### 4.1 Introduction

This chapter presents the results and discussions of the results of the study. The presentation of the results is based on the research objectives. The chapter starts with descriptive statistics of the study variables, correlation analysis and test of hypotheses. Finally, the chapter presents discussion of the study.

#### 4.2 Descriptive Statistics

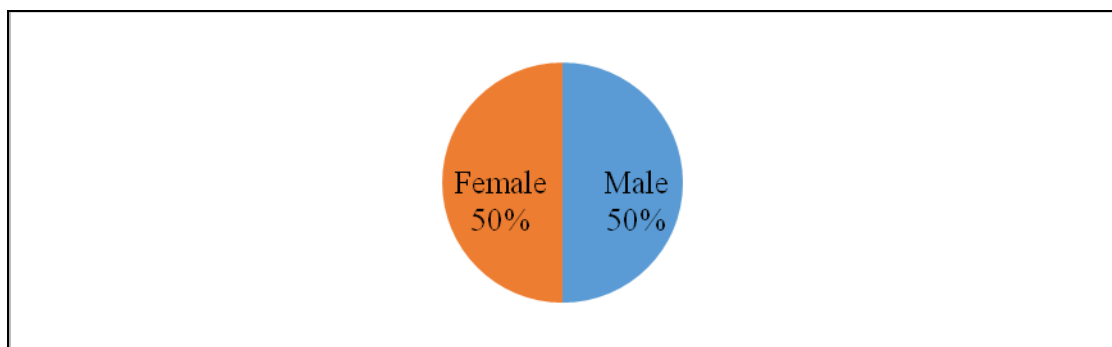
This section presents and discusses results of descriptive statistics of the respondents. It also presents descriptive analyses results of the study variables.

##### 4.2.1 Response Rate

The study targeted 274 smallholder farmers drawn from 12 Farmers' Cooperative Societies spread across three constituencies of Bobasi, Nyaribari Masaba and Nyaribari Chache in Kisii County. A total of all 274 respondents participated in the study by completing the questionnaires. All the 274 questionnaires were retrieved from the 12 FCS managers after being completed and returned to them by individual farmers.

##### 4.2.2 Gender of the Respondents

The researcher sought to establish the gender distribution of the study subject. The findings are as indicated in Figure 4.1.

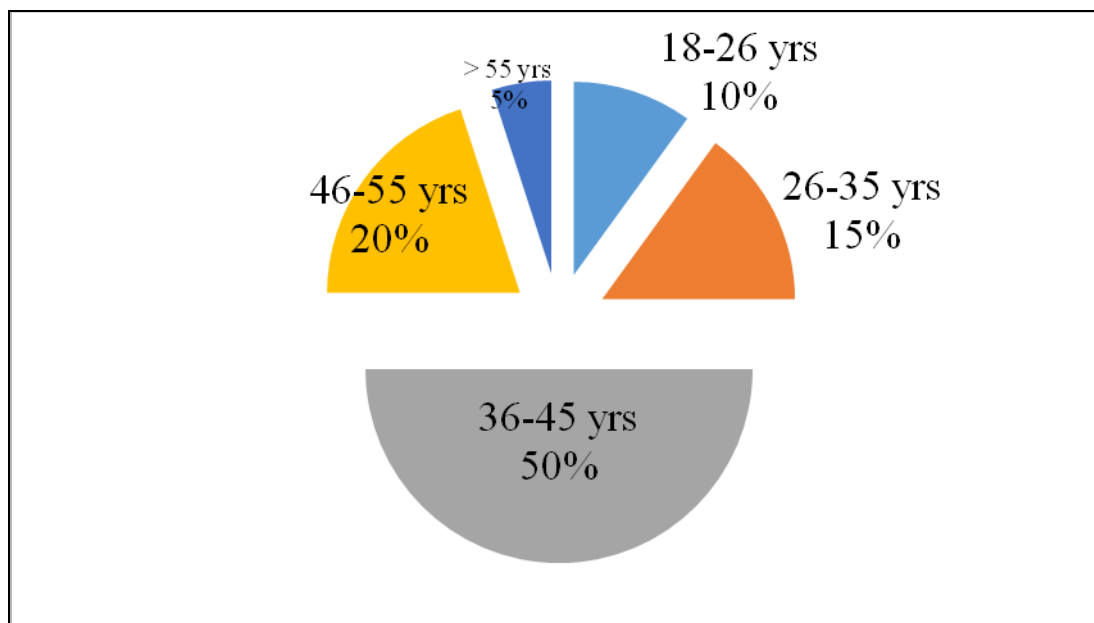


**Figure 4. 1: Gender of the respondents**

Figure 4.1 shows that an equal number of male and female farmers participated in the study.

### 4.2.3 Age of the Respondents

The researcher sought to establish the age distribution of the study respondents. The findings are as indicated in Figure 4.2.



**Figure 4. 2: Age distribution of Respondents**

Figure 4.2 shows that 95% of the respondents were aged below 55 years. In addition, the figure reveals that 75% of the farmers were aged between 18 and 45 years. This implies that the younger generation are involved in pyrethrum farming and marketing. This also implies that the study results will be a reflection of the youthful farmers since they are the majority in the study.

### 4.2.4 Quality of Pyrethrum Products

The respondents were asked to give their opinion on pyrethrum quality related factors by indicating how strongly they agreed or disagreed to the quality statements in the questionnaire. The result of their responses is summarised in Table 4.1.

**Table 4. 1: Quality of Pyrethrum**

<b>Quality Statements</b>	<b>SA</b>	<b>A</b>	<b>N</b>	<b>DA</b>	<b>SD</b>
	<b>(%)</b>	<b>(%)</b>	<b>(%)</b>	<b>(%)</b>	<b>(%)</b>
1 I have planted usual pyrethrum varieties	60	20	0	15	5
2 I have new varieties from PBK with high content	40	45	10	5	0
3 I deliver dry pyrethrum flowers to the buying centers	90	10	0	0	0
4 After drying our flowers I deliver them immediately to the buying centers.	75	15	0	6	4
5 The dry flowers I deliver are clean from stalks, stones, animal waste, and other particles.	50	20	0	20	10
6 I am paid depending on the dryness, cleanliness and pyrethrins content of my flowers	20	65	10	5	0
7 My flowers delivered to the buying centers are transported to PBK factory within one week after delivery	30	20	20	20	10
8 Pyrethrum is not harmful to me (human)	70	20	10	0	0

Source: Survey data (2017)

As shown in Table 4.1, the study sought to establish the influence of quality related factors on marketing of pyrethrum products of smallholder farmers in Kisii County. The findings from this data show that the pyrethrum growers have sufficient information on the quality control system so as to maintain the aspect of pyrethrum quality to secure their markets.

In regard to pyrethrum varieties planted, Table 4.1 shows that 80% have planted usual local varieties, while 95% agree that they have new high content varieties from PBK. Regarding the dryness of flowers, 100% of the farmers agree that they only deliver sufficiently dry flowers. On the lead time to deliver the flowers to buying centres after drying, 90% deliver immediately. And on whether they deliver clean flowers, 70% do while 30% reveal that they do not deliver clean flowers. Majority of farmers (85%) confirm that they are paid based on dryness, cleanliness and pyrethrins content while 10% did not have an opinion and 5% disagreed. Regarding whether transportation of

dry flowers to PBK factory is done within a week after delivery to the collection centres, 50% agreed that this is done within a week, 20% had no opinion, while 30% disagreed. This factor reveals that there are delays in delivery of flowers to PBK factory from the consolidation points. Finally when asked whether pyrethrum is safe to humans, 90% agreed while 10% had no opinion. This implies that the farmers are aware of the safety of natural pyrethrum.

These findings confirm findings in reviewed literature that pyrethrum farmers are paid based on Pyrethrins content, (Kamau, 2016). This is also true as shown in the pyrethrum price list in Appendix IV, a confirmation that pyrethrum farmers are paid based on the quality of their dry flowers, and the pyrethrin content. Therefore it is evident that the pyrethrum quality is an important factor in influencing pyrethrum marketing.

#### **4.2.5 Competition on Pyrethrum**

The study examined the influence of competition from other crops and other pyrethrum producing countries on the marketing of pyrethrum among smallholder farmers in Kisii County. This was done using percentages as shown in Table 4.2.

**Table 4. 2: Competition on Pyrethrum**

<b>Competition Statements</b>		<b>SA</b>	<b>A</b>	<b>N</b>	<b>DA</b>	<b>SD</b>
		<b>(%)</b>	<b>(%)</b>	<b>(%)</b>	<b>(%)</b>	<b>(%)</b>
1	I grow pyrethrum together with cabbages, beans, peas, potatoes, maize and other crops in our farms.	80	15	0	5	0
2	Pyrethrum earnings are higher than from other crops (cabbages, beans, maize, peas, potatoes and other crops)	50	05	0	25	20
3	I sell all our pyrethrum flowers to PBK	60	10	0	30	0
4	There are other buyers who buy pyrethrum flowers from farmers	75	15	0	6	4
5	Pyrethrum is grown in other countries (such as Rwanda, Tanzania)	40	20	40	0	0
6	Pyrethrum prices move up and down depending on market prices	20	65	10	5	0
7	I am paid a relatively constant price for pyrethrum flowers all year round.	30	30	0	30	10
8	Pyrethrum has ready market	40	5	0	5	50

Source: Survey data (2017)

The findings from Table 4.2 have an important implication for this study. The findings show that pyrethrum is facing stiff competition from other crops with 95% agreeing and strongly agreeing that they grow other crops other than pyrethrum. Yet, while 55% agree that pyrethrum earnings are better than from other crops, 45% disagree. This implies that pyrethrum faces stiff competition for land resources from other alternative crops. Besides the PBK buying pyrethrum from farmers (70%), the findings indicate that there are other buyers (30%) of the crop thus posing a competition to PBK. This is supported by the fact that 90% agreed that there are other buyers of flowers other than PBK, against 10% who disagreed. There was 60% in agreement to the question whether there are other counties growing pyrethrum, while 40% had no opinion.

This implies that the farmers are aware of other countries competing of the global pyrethrum market. On market pricing, 85% agree that prices are not static, while 10% had no opinion yet 5% disagreed. And on payments for pyrethrum flowers, 60% agreed that they are paid relatively constant prices while 40% disagreed. These two questions reveal that farmers follow the global commodity prices and are keen to compare their payments to the global prices for pyrethrum. Finally, while 55% of the farmers feel that there is no ready market for pyrethrum, 45% strongly agree that there is ready market. This implies that farmers are privy to global pyrethrum market developments, and that they can venture more into pyrethrum marketing as its market demand thrive.

#### **4.2.6 Farmers' Cooperative Societies and Marketing of Pyrethrum**

The study sought to determine the influence of farmers' cooperative societies on the marketing of pyrethrum products by smallholder farmers in Kisii County. The researcher sought to find out from the farmers whether the farmers' cooperative societies actively supported them in terms of provision of planting materials, farm inputs, consolidation of dry flowers, transportation, payments, and overall ,management and service. This was done using percentages as shown in Table 4.3.

**Table 4. 3: Farmers' Cooperative Societies and Marketing of Pyrethrum**

	<b>Farmers' Cooperative Societies Statements</b>	<b>SA</b>	<b>A</b>	<b>N</b>	<b>DA</b>	<b>SD</b>
		<b>(%)</b>	<b>(%)</b>	<b>(%)</b>	<b>(%)</b>	<b>(%)</b>
1	My cooperative society provides me with pyrethrum planting materials (seedlings and splits)	6	92	2	0	0
2	My cooperative society provides me with farm inputs (fertilizers, insecticides) for pyrethrum growing	0	19	15	33	34
3	My cooperative society collects, weighs, records and stores my dry pyrethrum flowers	6	0	0	94	0
4	My cooperative society coordinates the collection and transportation of dry flowers to PBK factory	6	93	0	1	0
5	I get payments for delivered flowers through my cooperative society	89	6	5	0	0
6	I get prompt payments for all my flower deliveries (within a month after delivery)	0	0	0	96	4
7	My cooperative society deducts money from my payment for flowers	88	12	0	0	0
8	My cooperative society officials were elected by members in a general meeting	94	6	0	0	0
9.	My cooperative society serves me very well in collection, and payment for our pyrethrum flowers	83	4	3	10	0

Source: Survey data (2017)

The results indicate that majority of the respondents (98%) agreed that the cooperative society provides pyrethrum planting materials (seedlings and splits), 2% had no opinion. This implies that the key strength of the cooperative societies is through provision of pyrethrum planting materials. On supply of other farm inputs such as fertilizers and insecticides for pyrethrum growing (67%) disagreed, 15% had no

opinion while 19% agreed. This implies that there is room for improvement for the farmers' cooperative societies through provision of these farm inputs.

A high (94%) disagreed that the cooperative society collects, weighs, records and stores their dry pyrethrum flowers. While 99% agreed that the cooperative societies coordinate the collection, and transportation of dry flowers to the PBK factory. This strongly implies that the role of the FCS is mainly that of coordination and not intermediate storage. Furthermore, majority of the respondents (95%) agreed that they get paid for their delivered dry flowers through the cooperative societies, yet (100%) disagreed that payments are prompt (within a month after delivery). This implies that the other key role of the FCS is channel through which payments are made, though the payments are not prompt. In addition all the respondents (100%) agreed that their cooperative society deducts money from their payment for flowers, (100%) agreed that their cooperative society officials were elected by members in a general meeting. Finally majority of the respondents (87%) agreed that their cooperative society serves them very well in collection, and payment for their pyrethrum flowers. This last batch of questions reveals that the farmers are aware of the management role of the FCS, and they agree to the deductions to run their cooperatives. They also elect their leaders in an annual general meeting, who serve them satisfactorily well.

The findings agree with the argument by Quint (2014) who observed that while many cooperatives may have struggled and disappeared, others have recast themselves in order to cope better with the changes in global markets. Cooperatives and rural associations are now resurgent business forms in Africa. Thurston (1984), noted that the potential therefore for farmer associations to improve the livelihoods of the rural population and contribute to a decrease in poverty may well depend on a new generation of dynamic farmers' cooperative societies.



#### 4.2.7 Infrastructure and Marketing of Pyrethrum Products

The study sought to describe the influence of infrastructure on marketing of pyrethrum products by small holder farmers, and percentages were used. The findings are presented in Table 4.4.

**Table 4. 4: Infrastructure and Marketing of Pyrethrum Products**

	<b>Infrastructure on marketing</b>	<b>SA</b>	<b>A</b>	<b>N</b>	<b>DA</b>	<b>SD</b>
		<b>(%)</b>	<b>(%)</b>	<b>(%)</b>	<b>(%)</b>	<b>(%)</b>
1	The roads from our farms to the buying centers are all weather, murrum or tarmacked	40	10	0	40	10
2	Transportation of flowers from our farms to the buying centers to the factory is not delayed due to bad (impassable) roads	10	20	0	10	60
3	Pyrethrum flowers are not stored in the cooperative society stores for more than a week after delivery	15	10	10	50	15
4	The flower storage stores roofs are not leaking	55	30	0	10	5
5	The flower stores do not expose flowers to direct sunlight,	40	20	0	10	30
6	The flowers in the stores do not get contaminated with soil, stones, animal waste etc.	10	20	0	40	30
7	During storage and transportation of flowers, there are minimum flower losses to spillages	25	25	0	35	15

Source: Survey data (2017)

The data in Table 4.4 summarises responses about the influence of infrastructure on the marketing of pyrethrum. On whether the roads from their farms to the buying centers and FCS were all-weather, murrum or tarmacked, an equal number of respondents (50%) agreed and (50%) disagreed. This implies that depending on the location of the farms, some are within good proximity to improved infrastructure while an equal number is disadvantaged due to poor roads. Further, (70%) disagree that the transportation of flowers is not delayed due to bad (impassable) roads.

This implies that farmers' pyrethrum flowers are delayed from reaching the PBK factory. Majority (65%) disagree that their flowers do not stay for more than a week after delivery, before transported to the PBK factory. Only 25% agree. This conforms to the farmers' responses that there are delays to transporting their flowers to the PBK factory.

On whether their stores at the FCS are not leaking, 85% agree while 15% disagree. This implies that there is a possibility of the quality of the flowers being reduced through rotting, hence reducing marketability of the flowers. The responses on whether the stores do not expose the flowers to direct sunlight, 60% agree while 40% disagree. The implication of the exposure at 40% is that chances are the quality of pyrethrum flowers deteriorates while in storage, reducing their marketability and pricing. And on whether the flowers in the FCS stores do not get contaminated with soil, stones, animal and other wastes, 30% strongly agree while 70% disagree. This implies that cleanliness of the flowers is largely compromised while being stored at the collection centre stores and this reduces the marketability of pyrethrum from the smallholder farmers. And finally on whether during storage and transportation of flowers there are minimum flower losses to spillages, 50% agree while 50% disagree. This implies that farmers perceive losses in quantity during storage and transportation, which robs them of the ideal market value for their delivered flowers. In summary, this indicates that due to poor infrastructure, the flowers take more time in the cooperative societies' stores, are prone to mix with dirt, are prone to be exposed to direct sunlight and rain, hence affecting their marketability and value.

According to recent studies, Kenyan traders in agricultural produce face high transportation and other transaction costs due to poor roads and other market inefficiencies. These costs have been shown to influence the agricultural sector as they influence the difference between farm gate prices and retail prices in the final consumer market – the marketing margin. Marketing margins influence farm gate prices of farm inputs and the retail prices of farm produce. Therefore, it is implied that infrastructure plays a pivotal role in the marketing of pyrethrum from smallholder farmers in Kisii County.

### 4.2.8 Marketing of Pyrethrum Products

The study examined the marketing of pyrethrum products by small holder farmers. The findings are presented in Table 4.5.

**Table 4. 5: Marketing of Pyrethrum Products**

Marketing Statements		SA	A	N	DA	SD
		(%)	(%)	(%)	(%)	(%)
1	The pyrethrum price is based on pyrethrins content	40	33	27	0	0
2	The price paid to farmers has a better margin than other crops	0	7	11	44	38
3	Farmers earn better returns from pyrethrum compared to other agribusinesses	0	7	37	56	0
4	Pyrethrum customers visit pyrethrum farmers to establish source of product	9	13	7	30	41
5	Pyrethrum customers place repeat orders frequently as informed by PBK during FCS Annual General Meetings	0	15	14	40	31
6	There is increasing global demand for pyrethrum as informed to farmers during Annual General Meetings.	37	35	1	0	27
7	Pyrethrum Board is deemed as a reliable supplier of pyrethrum – as informed by PBK during AGMs.	15	12	4	30	39
8	Customers who used to buy Kenya Pyrethrum in the 1980s are still buying from PBK	0	0	8	22	70
9.	Kenya has not lost her traditional pyrethrum customers such as SC Johnson	27	27	7	36	3

Source: Survey data (2017)

The results indicate that majority of the respondents (73%) agreed that the pyrethrum price is based on pyrethrins content, while the remaining 27% had no opinion. This implies that farmers are aware of the importance of high pyrethrin content flowers on their market pricing. Majority (82%) disagreed on the opinion that the price paid to

farmers has a better margin than other crops. Further, (56%) disagreed that farmers earn better returns from pyrethrum compared to other agribusinesses. The two sets of responses imply that farmers are aware of other agribusinesses with better revenue returns than pyrethrum.

Majority of the respondents (71%) disagreed that pyrethrum customers visit pyrethrum farmers to establish source of product. Furthermore (71%) disagreed that pyrethrum customers place repeat orders frequently as informed by PBK during FCS Annual General Meetings. Majority of the respondents (72%) agreed that there is increasing global demand for pyrethrum as informed to farmers during Annual General Meetings. This implies that the farmers trust that there is sufficient demand for pyrethrum, and this confirms their continued investment in the crop.

On whether “Pyrethrum Board is deemed as a reliable supplier of pyrethrum as informed by PBK during AGMs”, 27% agreed while 69% disagreed. Further, 92% disagreed that customers who used to buy Kenya Pyrethrum in the 1980s are still buying from PBK. Finally a slight majority of the respondents (54%) agreed that Kenya has not lost her traditional pyrethrum customers such as SC Johnson, against 39% who disagreed. This implies that although the farmers agreed that there is growing global demand for pyrethrum products, all other indicators to harnessing this market share were annulled by lack of repeat orders, loss of traditional customers and the opinion that PBK is not considered as a reliable supplier of pyrethrum products. This may explain why the farmers engage in mixed agribusiness activities to cushion this perceived risk and uncertainty on pyrethrum marketing.

### **4.3 Test of Hypotheses**

This section discusses the results of hypotheses testing in relation to the research hypotheses.

#### **4.3.1 Selected Factors and Marketing**

The study sought to examine how the variables of the study; quality related factors, competition related factors, farmers’ cooperative societies, infrastructure related factors influence marketing of pyrethrum products ( $H_{01}$ - $H_{04}$ ). This was done using Pearson’s correlation analysis. The results are presented in Table 4.6.

**Table 4.6: Correlation Matrix for Relationship between Selected Factors and Marketing of Pyrethrum Products among Small Holder Farmers**

		<b>Correlations</b>				
		Quality Related Factors	Competition Related Factors	Farmers' Cooperative Societies	Infrastructure Related Factors	Marketing of Pyrethrum Products
Quality Related Factors	Pearson Correlation	1	.068	.109	-.155*	.271**
	Sig. (2-tailed)		.265	.071	.010	.000
	N	274	274	274	274	274
Competition Related Factors	Pearson Correlation	.068	1	.076	.035	.563
	Sig. (2-tailed)	.265		.208	.566	.000
	N	274	274	274	274	274
Farmers' Cooperative Societies	Pearson Correlation	-.109	-.076	1	.232**	.128*
	Sig. (2-tailed)	.071	.208		.000	.035
	N	274	274	274	274	274
Infrastructure Related Factors	Pearson Correlation	-.155*	-.035	.232**	1	.523**
	Sig. (2-tailed)	.010	.566	.000		.000
	N	274	274	274	274	274
Marketing of Pyrethrum Products	Pearson Correlation	-.271**	-.057	.128*	.523**	1
	Sig. (2-tailed)	.000	.349	.035	.000	
	N	274	274	274	274	274

\*. Correlation is significant at the 0.05 level (2-tailed).

#### **4.3.1.1 Quality Related Factors and Marketing of Pyrethrum Products of Smallholder Farmers**

The study sought to examine the influence of quality related factors on marketing of pyrethrum products of smallholder farmers. It was hypothesized (Hypothesis H<sub>01</sub>) that quality related factors have no significant influence on marketing of pyrethrum products by smallholder farmers. Data was analyzed using Pearson's correlation. The results in Table 4.6 indicate that there is a positive significant relationship between quality related factors and marketing of pyrethrum products by smallholder farmers ( $r = 0.271, p < 0.05$ ). Therefore according to the results, the hypothesis that: There is no

significant influence of quality related factors on marketing of pyrethrum products by smallholder farmers in Kisii County was rejected. Therefore it was concluded that quality related factors have a positive influence on marketing of pyrethrum products by smallholder farmers in Kisii County.

These findings are consistent with the reviewed literature where Aaker and Jacobson (1994) reported that perceived product quality is related to increased sales and profits and consumers make their purchase decisions in relation to perceived quality. Thus the finding of the study empirically confirms the perspective that quality related factors influence the marketing of pyrethrum products by smallholder farmers.

#### **4.3.1.2 Competition Related Factors and Marketing of Pyrethrum Products of Smallholder Farmers**

The study sought to examine the influence of competition related factors on marketing of pyrethrum products of smallholder farmers. It was hypothesized (Hypothesis H<sub>02</sub>) that competition related factors have no significant influence on marketing of pyrethrum products by smallholder farmers. Data was analyzed using Pearson's correlation. The results in Table 4.6 indicate that there is a positive significant relationship between competition related factors and marketing of pyrethrum products by smallholder farmers ( $r = 0.563, p < 0.05$ ). Therefore according to the results, the hypothesis that: There is no significant influence of competition related factors on marketing of pyrethrum products by smallholder farmers in Kisii County was rejected. Therefore it was concluded that competition related factors have a positive influence on marketing of pyrethrum products by smallholder farmers in Kisii County.

These findings are consistent with the reviewed literature where (Contant, 1985) observe that in the fight for market share, competition is not manifested only in the other players. Rather, competition in an industry is rooted in its underlying economies, and competitive forces that go well beyond the established combatants in a particular industry. Thus the finding of the study empirically confirms the perspective that competition related factors influence the marketing of pyrethrum products by smallholder farmers.

#### **4.3.1.3 Farmers' Cooperative Societies and Marketing of Pyrethrum Products of Smallholder Farmers**

The study sought to examine the influence of farmers' cooperative societies on marketing of pyrethrum products of smallholder farmers. It was hypothesized (Hypothesis H<sub>03</sub>) that farmers' cooperative societies have no significant influence on marketing of pyrethrum products by smallholder farmers. Data was analyzed using Pearson's correlation. The results in Table 4.6 indicate that there is a positive significant relationship between farmers' cooperative societies and marketing of pyrethrum products by smallholder farmers ( $r = 0.128, p < 0.05$ ). Therefore according to the results, the hypothesis that: There is no significant influence of farmers' cooperative societies on marketing of pyrethrum products by smallholder farmers in Kisii County was rejected. Therefore it was concluded that farmers' cooperative societies have a positive influence on marketing of pyrethrum products by smallholder farmers in Kisii County.

The findings support the argument by Quint (2014) who observed that while many cooperatives may have struggled and disappeared, others have recast themselves in order to cope better with the changes in global markets. Cooperatives and rural associations are now resurgent business forms in Africa. Thus the finding of the study empirically confirms the perspective that farmers' cooperative societies influence the marketing of pyrethrum products by smallholder farmers.

#### **4.3.1.4 Infrastructure Related Factors and Marketing of Pyrethrum Products of Smallholder Farmers**

The study sought to examine the influence of infrastructure related factors on marketing of pyrethrum products of smallholder farmers. It was hypothesized (Hypothesis H<sub>04</sub>) that infrastructure related factors have no significant influence on marketing of pyrethrum products by smallholder farmers. Data was analyzed using Pearson's correlation. The results in Table 4.6 indicate that there is a positive significant relationship between infrastructure related factors and marketing of pyrethrum products by smallholder farmers ( $r = 0.523, p < 0.05$ ). Therefore according to the results, the hypothesis that: There is no significant influence of infrastructure related factors on marketing of pyrethrum products by smallholder farmers in Kisii County was rejected.

Therefore it was concluded that infrastructure related factors have a positive influence on marketing of pyrethrum products by smallholder farmers in Kisii County.

The findings of the study agrees with literature that Kenyan traders in agricultural produce face high transportation and other transaction costs due to poor roads and other market inefficiencies. These costs have been shown to influence the agricultural sector as they influence the difference between farm gate prices and retail prices in the final consumer market – the marketing margin. Thus the finding of the study empirically confirms the perspective that infrastructure related factors influence the marketing of pyrethrum products by smallholder farmers.

#### **4.3.2 Influence of Quality Related Factors, Competition Related Factors, Farmers' Cooperative Societies, and Infrastructure Related Factors on Marketing of Pyrethrum Products of Small Holder Farmers**

The study ascertained the influence of quality related factors, competition related factors, farmers' cooperative societies, and infrastructure related factors on marketing of pyrethrum products of small holder farmers in Kisii County. The results in relation to the foregoing are illustrated in Tables 4.7



**Table 4.7: Multiple Regression Results for the Effect of Selected Factors on Marketing of Pyrethrum Products among Small Holder Farmers.**

<b>Model Summary</b>						
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate		
1	.558 <sup>a</sup>	.321	.301	.82242		
<b>ANOVA<sup>a</sup></b>						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	82.346	4	20.587	30.437	.000 <sup>b</sup>
	Residual	181.387	269	.676		
	Total	264.289	273			
<b>Coefficients</b>						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		Beta	Std. Error	Beta		
	(Constant)	1.371	.371		3.694	.000
	Quality Related Factors	.241	.147	.421	1.640	.008
1	Competition Related Factors	.219	.144	.286	1.517	.036
	Farmers' Cooperative Societies	.173	.117	.317	1.481	.045
	Infrastructure Related Factors	.907	.096	.495	9.423	.000

a. Predictors: (Constant), Quality Related Factors, Competition Related Factors, Farmers' Cooperative Societies, Infrastructure Related Factors

b. Dependent Variable: Marketing of pyrethrum products of small holder farmers

The model in Table 4.7 shows the influence of selected factors on marketing of pyrethrum products among small holder farmers. The Model shows that R Square is 0.321, which shows that 32.1% of the variation in marketing of pyrethrum products among small holder farmers is explained by quality related factors, competition related factors, farmers' cooperative societies, and infrastructure related factors.

The ANOVA demonstrates test for the combined effect of quality related factors, competition related factors, farmers' cooperative societies, and infrastructure related factors on marketing of pyrethrum products among small holder farmers. The ANOVA results show that the model was significant ( $F = 30.587, p < 0.05$ ). This indicates that quality related factors, competition related factors, farmers' cooperative societies, and infrastructure related factors jointly have a positive and significant effect on marketing of pyrethrum products of small holder farmers.

The standardized coefficients show that the effect of quality related factors on marketing of pyrethrum products among small holder farmers is positive and significant ( $\beta = 0.421, t = 1.640, p < 0.05$ ), the effect of competition related factors on marketing of pyrethrum products among small holder farmers is positive and significant ( $\beta = 0.286, t = 1.517, p < 0.05$ ), the effect of farmers' cooperative societies is positive and significant ( $\beta = 0.317, t = 1.481, p < 0.05$ ). Finally the effect of infrastructure related factors on marketing of pyrethrum products among small holder farmers is positive and significant ( $\beta = 0.495, t = 9.423, p < 0.05$ ),

The full regression model in Table 4.7 can also be interpreted to show how dimensions of selected factors affect marketing of pyrethrum products by smallholder farmers. The unstandardized coefficients show that for every unit increase in quality related factors, a 0.241 unit increase in marketing of pyrethrum products by smallholder farmers is predicted holding other variables constant. For every unit increase in competition related factors, a 0.219 unit increase in marketing of pyrethrum products by smallholder farmers is predicted holding other variables constant. For every unit increase in farmers' cooperatives, a 0.173 unit increase in marketing of pyrethrum products by smallholder farmers is predicted holding other variables constant. Finally for every unit increase in infrastructure related factors, a 0.907 unit increase in marketing of pyrethrum products by smallholder farmers is predicted holding other variables constant. From these findings we can infer that infrastructure related factors were influencing the marketing of pyrethrum of smallholder farmers most, followed by quality related factors, and then competition related factors and finally farmers' cooperative societies.

#### 4.5 Results of Hypotheses Testing

The results of hypothesis testing are shown in Table 4.8.

**Table 4.8 Results of Hypotheses Testing**

<b>Hypothesis</b>	<b>Result</b>
<b>H<sub>01</sub>:</b> There is no significant influence of quality related factors on marketing of pyrethrum products by smallholder farmers in Kisii County.	Hypothesis rejected
<b>H<sub>02</sub>:</b> There is no significant influence of competition related factors on marketing of pyrethrum products by smallholder farmers in Kisii County.	Hypothesis rejected
<b>H<sub>03</sub>:</b> There is no significant influence of farmers' cooperative societies on marketing of pyrethrum products by smallholder farmers in Kisii County	Hypothesis rejected
<b>H<sub>04</sub>:</b> There is no significant influence of infrastructure on marketing of pyrethrum products by smallholder farmers in Kisii County	Hypothesis rejected
<b>H<sub>05</sub>:</b> Quality related factors, competition related factors, farmers' Cooperative societies, and infrastructure related factors jointly do not have a significant influence on marketing of pyrethrum products by smallholder farmers in Kisii County	Hypothesis rejected

## CHAPTER FIVE

### SUMMARY, CONCLUSION AND RECOMMENDATION

#### 5.1 Introduction

This chapter gives a summary of the study findings. It also presents the recommendations, conclusion and areas for further research. The data was analyzed by use of SPSS package to produce the descriptive statistics. Frequency tables and charts were used to describe the data and draw conclusions on the findings.

#### 5.2 Summary of the Study

The first objective was to establish the influence of quality related factors on marketing of pyrethrum products by smallholder farmers in Kisii County. The findings reveal that there is significant influence of quality related factors on marketing of pyrethrum products by smallholder farmers in Kisii County. Thus Hypothesis  $H_{01}$  was rejected. The study revealed that all respondents admitted that they deliver dry pyrethrum flowers to the buying centers. Farmers are paid depending on the dryness, cleanliness and pyrethrins content of flowers, and pyrethrum is not harmful to humans. However, a considerable number of farmers revealed that pyrethrum flowers were not transported to PBK factory within one week after delivery to the buying and collection centers.

The second objective was to establish the influence of competition related factors on marketing of pyrethrum products by smallholder farmers in Kisii County. The findings reveal that there is significant influence of competition related factors on marketing of pyrethrum products by smallholder farmers in Kisii County. Thus Hypothesis  $H_{02}$  was rejected. The findings show that pyrethrum is facing stiff competition from other crops with farmers agreeing that they grow other crops other than pyrethrum. Yet, while some farmers agree that pyrethrum earnings are better than from other crops, an equal number of farmers disagree. The findings indicate that farmers prefer PBK as their buyer of flowers, but they also sell to others, posing a competition to PBK. This is almost unanimously supported by farmers who revealed that there are other buyers of flowers other than PBK. The study revealed that there is static market pricing for pyrethrum, yet farmers receive relatively constant prices throughout the year. The study revealed that despite the competition, there is market for pyrethrum in the global market.

The third objective was to establish the influence of Farmers' Cooperative Societies on marketing of pyrethrum products by smallholder farmers in Kisii County. The findings reveal that there is significant influence of Farmers' Cooperative Societies on marketing of pyrethrum products by smallholder farmers in Kisii County. Thus Hypothesis H<sub>03</sub> was rejected. The results indicate that the cooperative society provides pyrethrum planting materials in form of seedlings and splits. However, farmers disagreed that the cooperative society collects, weighs, records and stores their dry pyrethrum flowers, while at the same time agreeing that the cooperative societies coordinate the collection, and transportation of dry flowers to the PBK factory. The study also revealed that FCSs are the preferred mode of receiving payments from PBK, and farmers unanimously agreed that their cooperative society deducts money from their payment for flowers. Payments from PBK delay for more than one month after delivery of the flowers, the study revealed. Farmers elect their FCS leaders, and fund the management and marketing services offered by their farmers' cooperative societies. Therefore, FCSs have an influence on Pyrethrum marketing by smallholder farmers from Kisii County.

The fourth objective was to establish the influence of infrastructure related factors on marketing of pyrethrum products by smallholder farmers in Kisii County. The findings reveal that there is significant influence of infrastructure related factors on marketing of pyrethrum products by smallholder farmers in Kisii County. Thus Hypothesis H<sub>04</sub> was rejected. Delays in transportation of flowers from farms to the buying centers due to poor condition of roads, and contamination of flowers in the stores were the factors with the highest score. Flower storage stores were not leaking as revealed in the study, but there was a revelation about flower losses during storage and transportation. The study therefore revealed that due to state of infrastructure, the flowers take more time in the cooperative societies' stores, flowers are prone to mix with dirt, and therefore prone to be exposed to direct sunlight and rain, hence affecting their value and marketability.

The fifth objective was to determine the joint influence of quality related factors, competition related factors, farmers' cooperative societies, and infrastructure related factors on marketing of pyrethrum products by smallholder farmers in Kisii County. The findings reveal that there is significant influence of quality related factors, competition related factors, farmers' cooperative societies, and infrastructure related factors on marketing of pyrethrum products by smallholder farmers in Kisii County.

Thus Hypothesis  $H_{05}$  was rejected. The findings show the influence of selected factors on marketing of pyrethrum products among small holder farmers. It was established that 32.1% of the variation in marketing of pyrethrum products among small holder farmers is explained by the selected factors in the study. The results from the full regression were interpreted to show how dimensions of selected factors affect marketing of pyrethrum products by smallholder farmers. From the findings infrastructure related factors were influencing the marketing of pyrethrum of smallholder farmers the most, followed by quality related factors, and then competition related factors and finally farmers' cooperative societies had the least influence.

### **5.3 Conclusion**

The results of the study revealed that there is significant influence of the selected factors on the marketing of pyrethrum products by smallholder farmers in Kisii County. The findings of the study lead to the following conclusions:

The first objective was to establish the influence of quality on marketing of pyrethrum products of smallholder farmers in Kisii County. The findings indicate that the pyrethrum farmers in Kisii County are paid based on the quality of their dry flowers exhibited by quality factors such as dryness, cleanliness and especially on the pyrethrin content. The findings revealed that for every unit increase in quality related factors, a 0.241 unit increase in marketing of pyrethrum products by smallholder farmers is predicted holding other variables constant.

The second objective was to establish the influence of competition related factors on the marketing of pyrethrum products of smallholder farmers in Kisii County. The findings reveal that three thirds of the farmers in the area of study do not prefer pyrethrum as their number one cash crop since it is facing competition for acreage from other crops such as beans and bananas. However, a third of the farmers rated pyrethrum as their number one cash crop. The findings also revealed that for every unit increase in competition related factors, a 0.219 unit increase in marketing of pyrethrum products by smallholder farmers is predicted holding other variables constant.

The third objective was to determine the influence of farmers' cooperative societies on the marketing of pyrethrum products of smallholder farmers in Kisii County. The

findings of the study indicate that Farmers' cooperative societies play a key role in consolidation of pyrethrum products for ease of transportation to the market. It was also revealed that payments for delivered pyrethrum flowers are made through the FCSs though the payments from PBK are not prompt. The findings revealed that for a unit increase in farmers' cooperative societies, a corresponding 0.173 unit increase in marketing of pyrethrum products by smallholder farmers is predicted holding other variables constant.

The fourth objective was to determine the influence of infrastructure related factors on marketing of pyrethrum products of small holder farmers in Kisii County. The findings indicated that most roads in Kisii County are neither gravelled nor tarmacked. The farmers experience difficulties in transporting their dry flowers from the collection centers to the market. The findings also revealed that for every unit increase in infrastructure related factors a 0.907 unit increase in marketing of pyrethrum products by smallholder farmers is predicted holding other variables constant.

The fifth objective was to determine the joint influence of the selected factors of quality related factors, competition related factors, farmers' cooperative societies and infrastructure related factors on marketing of pyrethrum products from smallholder farmers in Kisii County. From the findings we can infer that infrastructure related factors were influencing the marketing of pyrethrum of smallholder farmers the most, followed by quality related factors, and then competition related factors and finally farmers' cooperative societies influencing the least.

## **5.4 Recommendations of the Study**

This study sought to determine influence of selected factors on the marketing of pyrethrum products by smallholder farmers in Kisii County. Since the findings revealed that there is significant influence of the selected factors on marketing, the following recommendations are made.

### **5.4.1 Recommendations for Policy and Practitioners**

This study has implications to governance and policy formulation and implementation by both the National and County governments and their Agencies. The analysis in this study contributes to the limited body of research work on pyrethrum marketing by

smallholder farmers. It is critical that government, research, extension and development agencies consider offering farmer extension services to support in improving the marketing of pyrethrum products by smallholder farmers.

To improve on quality to protect the pyrethrins content, it is important to consider common solar drying infrastructure facilities centrally located at the farmers' cooperative societies. This will not only enhance the pyrethrin content, but will also increase the general quality such as cleanliness and colour of the dry pyrethrum flowers. The study therefore recommends that in order to improve the marketing of pyrethrum from small holder farmers in Kisii County, the national and county governments and the Pyrethrum Directorate enhance pyrethrum quality to make it more competitive, revamp pyrethrum farmers' cooperative societies to improve marketing services to farmers, and improve infrastructure to ease logistics of pyrethrum products into the market.

#### **5.4.2 Recommendations for Further Studies**

This study was limited in scope. Out of 18 counties producing pyrethrum by smallholder farmers, only one county was studied. The factors studied were only four, yet more factors including social factors could be explored.

Further research should be carried out specifically on the underlying factors that will motivate pyrethrum farmers to grow and market more pyrethrum products. Possible analysis of the influence of direct access to the export markets could also be investigated.

Finally, this study could be conducted in other pyrethrum growing counties in Kenya so as to establish the selected factors that influence the marketing of pyrethrum by small holder farmers in those counties. This will enrich the pool of knowledge on pyrethrum marketing and help draw a better conclusion of the selected factors influencing marketing of pyrethrum products in Kenya.



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## APPENDICES

### Appendix I: Introductory Letter

Egerton University,

Nakuru Town Campus,

P.O. Box 13357,

Nakuru

Prof/Dr./Mr./Mrs./Miss .....

I am a postgraduate student pursuing a Masters of Business Administration (MBA – Marketing) degree at Egerton University. I am carrying out a research project on “Influence of Selected Factors on Marketing of Pyrethrum Products of Smallholder Farmers in Kisii County, Kenya.”

The purpose of this questionnaire is to gather information from pyrethrum farmers with knowledge and experience in pyrethrum growing and marketing. You have been identified as one of the respondents and you are kindly requested to share your knowledge and experience in pyrethrum to assist the researcher accomplish the study. The study will be undertaken from April 2014 to December 2014.

My supervisor and I assure you that the information supplied will be used for research purposes only and your name and views will be treated with confidentiality.

Thank you for your cooperation.

Samuel Maranga Matonda

## Appendix II: Study Questionnaire

### Part I: Respondent Personal Information

Name (optional) \_\_\_\_\_

Gender: Male ( ) Female ( )

Age : 18-25 \_\_ , 26-35 \_\_\_\_, 36-45 \_\_\_\_, 46-55\_\_\_\_, Above 55\_\_\_\_\_

### Part II: Selected Factors

Kindly indicate the degree of agreement or disagreement by ticking the choice that fits the situation in your case using the following key, where; **1**= Strongly Disagree (SD); **2**=Disagree (D); **3**= Neutral (N); **4**=Agree (A); **5**=Strongly Agree (SA)

(a)	Quality	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	I have planted usual pyrethrum varieties	1	2	3	4	5
2	I have new varieties from PBK with high content	1	2	3	4	5
3	I deliver dry pyrethrum flowers to the buying centers	1	2	3	4	5
4	After drying our flowers I deliver them immediately to the buying centers.	1	2	3	4	5
5	The dry flowers I deliver are clean from stalks, stones, animal waste, and other particles.	1	2	3	4	5
6	I are paid depending on the dryness, cleanliness and pyrethrins content of our flowers	1	2	3	4	5
7	Our flowers delivered to the buying centers are transported to PBK factory within one week after delivery	1	2	3	4	5
8	Pyrethrum flowers is not harmful to us (humans)	1	2	3	4	5
(b)	<b>Competition</b>	<b>SD</b>	<b>DA</b>	<b>N</b>	<b>A</b>	<b>SA</b>
1	I grow pyrethrum together with cabbages, beans, peas, potatoes, maize and other crops in my farm.	1	2	3	4	5

2	Pyrethrum earnings are higher than from other crops (cabbages, beans, maize, peas, potatoes and other crops)	1	2	3	4	5
3	I sell all my pyrethrum flowers to PBK	1	2	3	4	5
4	There are other buyers who buy pyrethrum flowers from farmers	1	2	3	4	5
5	Pyrethrum is grown in other countries (such as Rwanda, Tanzania)	1	2	3	4	5
6	Pyrethrum prices move up and down depending on market prices	1	2	3	4	5
7	I am paid a relatively constant price for pyrethrum flowers all year round.	1	2	3	4	5
8	Pyrethrum has ready market	1	2	3	4	5
<b>(c)</b>	<b>Farmers' Cooperative Societies</b>	<b>SD</b>	<b>DA</b>	<b>N</b>	<b>A</b>	<b>SA</b>
1	My cooperative society provides me with pyrethrum planting materials (seedlings and splits)	1	2	3	4	5
2	My cooperative society provides me with farm inputs (fertilizers, insecticides) for pyrethrum growing	1	2	3	4	5
3	My cooperative society collects, weighs, records and stores my dry pyrethrum flowers	1	2	3	4	5
4	My cooperative society coordinates the collection and transportation of dry flowers to PBK factory	1	2	3	4	5
5	I get payments for delivered flowers through my cooperative society	1	2	3	4	5
6	I get prompt payments for all my flower deliveries (within a month after delivery)	1	2	3	4	5
7	My cooperative society deducts money from my payment for flowers	1	2	3	4	5
8	My cooperative society officials were elected by members in a general meeting	1	2	3	4	5
9	My cooperative society serves me very well in collection, and payment for my pyrethrum flowers	1	2	3	4	5

<b>(d)</b>	<b>Infrastructure</b>	<b>SD</b>	<b>DA</b>	<b>N</b>	<b>A</b>	<b>SA</b>
1	The roads from my farm(s) to the buying centers are all weather murrum or tarmacked	1	2	3	4	5
2	Transportation of flowers from my farm(s) to the buying centers to the factory is not delayed due to bad (impassable) roads	1	2	3	4	5
3	Pyrethrum flowers are not stored in the cooperative society stores for more than a week after delivery	1	2	3	4	5
4	The flower storage stores roofs are not leaking	1	2	3	4	5
5	The flower stores do not expose flowers to direct sunlight,	1	2	3	4	5
6	The flowers in the stores do not get contaminated with soil, stones, animal waste etc.	1	2	3	4	5
7	During storage and transportation of flowers, there are minimum flower losses to spillages	1	2	3	4	5

### **Part III: Marketing of Pyrethrum Products**

Kindly indicate the degree of agreement or disagreement by ticking the choice that fits the situation in your case using the following key, where; **1= Strongly Disagree (SD)**; **2=Disagree (D)**; **3= Neutral (N)**; **4=Agree (A)**; **5=Strongly Agree (SA)**

<b>(e)</b>	<b>Marketing of Pyrethrum Products</b>	<b>SD</b>	<b>DA</b>	<b>N</b>	<b>A</b>	<b>SA</b>
1	The pyrethrum price is based on pyrethrins content	1	2	3	4	5
2	The price paid to farmers has a better margin than other crops	1	2	3	4	5
3	Farmers earn better returns from pyrethrum compared to other agribusinesses	1	2	3	4	5
4	Pyrethrum customers visit pyrethrum farmers to establish source of product	1	2	3	4	5
5	Pyrethrum customers place repeat orders frequently as informed by PBK during FCS Annual General Meetings	1	2	3	4	5

6	There is increasing global demand for pyrethrum as informed to farmers during Annual General Meetings	1	2	3	4	5
7	Pyrethrum Board is deemed as a reliable supplier of pyrethrum – as informed by PBK during AGMs	1	2	3	4	5
8	Customers who used to buy Kenya Pyrethrum in the 1980s are still buying from PBK	1	2	3	4	5
9	Kenya has not lost her traditional pyrethrum customers such as SC Johnson	1	2	3	4	5

### Appendix III: Krejcie and Morgan Sample Size Table

Required Sample Size <sup>†</sup>								
Population Size	Confidence = 95%				Confidence = 99%			
	Margin of Error				Margin of Error			
	5.0%	3.5%	2.5%	1.0%	5.0%	3.5%	2.5%	1.0%
10	10	10	10	10	10	10	10	10
20	19	20	20	20	19	20	20	20
30	28	29	29	30	29	29	30	30
50	44	47	48	50	47	48	49	50
75	63	69	72	74	67	71	73	75
100	80	89	94	99	87	93	96	99
150	108	126	137	148	122	135	142	149
200	132	160	177	196	154	174	186	198
250	152	190	215	244	182	211	229	246
300	169	217	251	291	207	246	270	295
400	196	265	318	384	250	309	348	391
500	217	306	377	475	285	365	421	485
600	234	340	432	565	315	416	490	579
700	248	370	481	653	341	462	554	672
800	260	396	526	739	363	503	615	763
1,000	278	440	606	906	399	575	727	943
1,200	291	474	674	1067	427	636	827	1119
1,500	306	515	759	1297	460	712	959	1376
2,000	322	563	869	1655	498	808	1141	1785
2,500	333	597	952	1984	524	879	1288	2173
3,500	346	641	1068	2565	558	977	1510	2890
5,000	357	678	1176	3288	586	1066	1734	3842
7,500	365	710	1275	4211	610	1147	1960	5165
10,000	370	727	1332	4899	622	1193	2098	6239
25,000	378	760	1448	6939	646	1285	2399	9972
50,000	381	772	1491	8056	655	1318	2520	12455
75,000	382	776	1506	8514	658	1330	2563	13583
100,000	383	778	1513	8762	659	1336	2585	14227
250,000	384	782	1527	9248	662	1347	2626	15555
500,000	384	783	1532	9423	663	1350	2640	16055
1,000,000	384	783	1534	9512	663	1352	2647	16317
2,500,000	384	784	1536	9567	663	1353	2651	16478
10,000,000	384	784	1536	9594	663	1354	2653	16560
100,000,000	384	784	1537	9603	663	1354	2654	16584
300,000,000	384	784	1537	9603	663	1354	2654	16586

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#### Appendix IV: Pyrethrum Price List Based on Pyrethrin Content

##### Pyrethrum Board of Kenya Dry Flower Producer Payment Rates - Price List

Pyrethrin Content (%)	PRICE IN KHS / KG	
	OLD Price	NEW Price
0.8	58.40	100.00
0.9	65.70	112.50
1.0	73.00	125.00
1.1	80.30	137.50
1.2	87.60	150.00
1.3	94.90	162.50
1.4	102.20	175.00
1.5	109.50	187.50
1.6	116.90	200.00
1.7	124.10	212.50
1.8	131.40	225.00
1.9	138.70	237.50
2.0	146.00	250.00
2.1	153.30	262.50
2.2	160.60	275.00
2.3	167.90	287.50
2.4	175.20	300.00
2.5	182.50	312.50
2.6	189.80	325.00
2.7	197.10	337.50
2.8	204.40	350.00
2.9	211.70	362.50
3.0	219.00	375.00

Source: Pyrethrum Board of Kenya, 2017