Coffee Economic Viability Study

Authored on Behalf of the Kenya Coffee Platform through research by Coffee Management Services.

ABBREVIATIONS

AFA   -   Agriculture and Food Authority

AFCA   -   Africa Fine Coffee Association

BBC   -   Bacterial Blight of Coffee

CBD   -   Coffee Berry Disease

CLR   -   Coffee Leaf Rust

CMS   -   Coffee Management Services Ltd

COP   -   Colombian Pesos

CRI   -   Coffee Research Institute.

ERP   -   Enterprise Resource Planning

FCS   -   Farmer Cooperative Society (ies)

GAPs   -   Good Agricultural Practices

GCP   -   Global Coffee Platform

GHG   -   Green House Gas

ILO   -   International Labour Organization

NCE   -   Nairobi Coffee Exchange

OT   -   Outturn

PCRs   -   Producer Crop Returns

SAI   -   Social Accountability International

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EXECUTIVE SUMMARY

This report presents the results of the analysis of the data collected for the coffee economic study in all coffee producing counties across the country in March 2018. This study consisted of in-depth interviews with a target of 540 coffee farming households. The primary counties in which the sample was targeted are based on the contribution to the national production as shown in the following graph:

Figure 1: National Production Distribution Overview
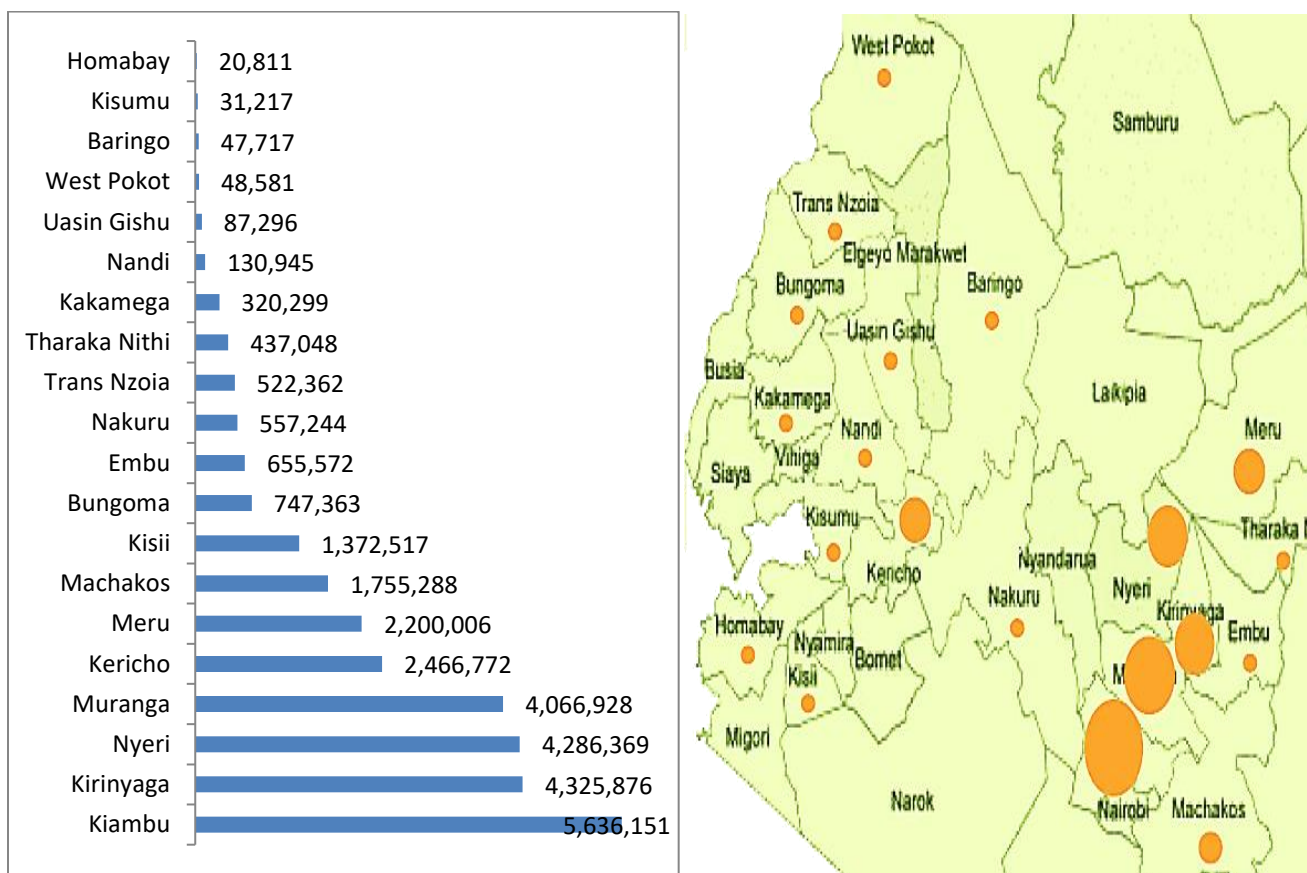
Source: Author's Graphs using NCE data

The sampled estates, smallholders and wet mills were selected randomly in the respective counties. The following figure shows the county and the respective farmers sampled.

Figure 2: Coffee Growers Sampled in each County
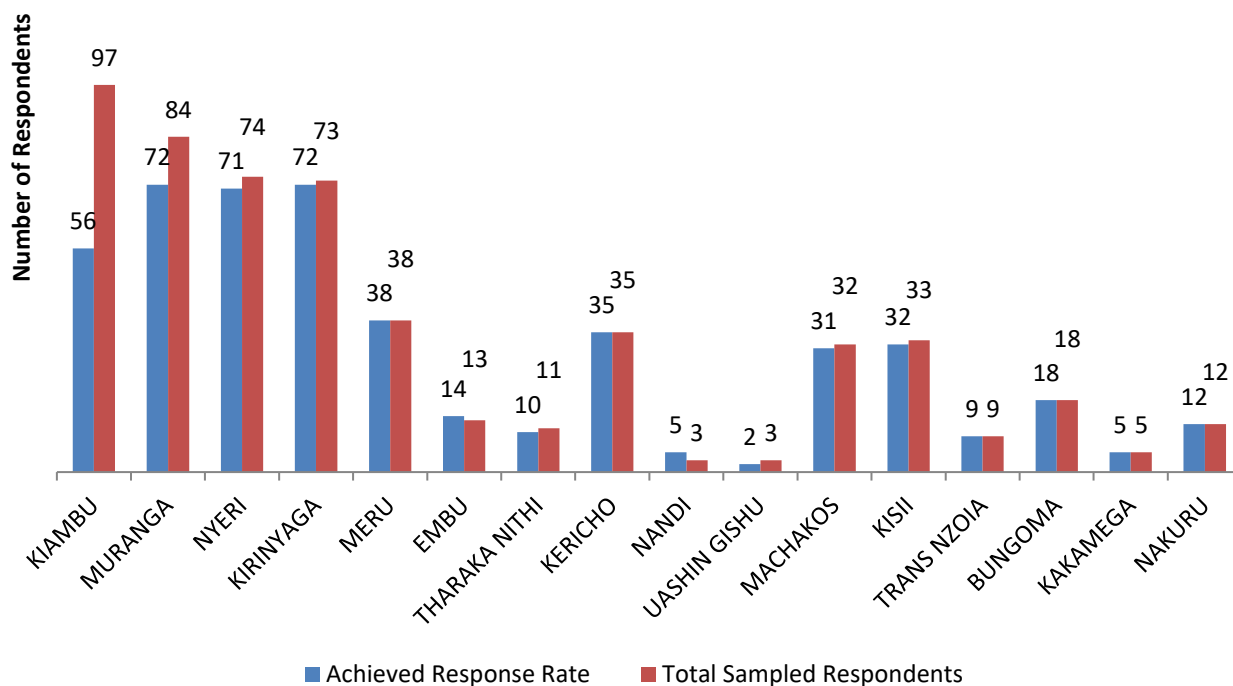
A total of 495 respondents were interviewed from the different counties in coffee growing areas. However, after cleanup of the data the respondents whose information was used in data analysis is as follows:

Table 1: Coffee Growers that participated in the Study

County	Number of Smallholder farmers	Number of Estate farmers	Number of Wetmills	Achieved Response Rate
KIAMBU	26	27	3	56
MURANGA	48	21	3	72
NYERI	61	5	5	71
KIRINYAGA	66	2	4	72
MERU	32	2	4	38
EMBU	10	2	2	14
THARAKA NITHI	9		1	10
KERICHO	29	2	4	35
NANDI	2	1	2	5
UASHIN GISHU	1		1	2
MACHAKOS	26	1	4	31
KISII	26	2	4	32
TRANS NZOIA	4	3	2	9
BUNGOMA	13	2	3	18
KAKAMEGA	3	1	1	5
NAKURU	7	2	3	12
363	**73**	**46**	**482**

All participants selected for the study were growing coffee and indeed made a contribution to the national coffee volumes as per the NCE transaction listing reports in the season 2016/17. Since quantitative analyses alone could not provide the in-depth understanding of the livelihood systems employed by the coffee growers, this quantitative study is supplemented by a series of (qualitative) discussions captured in narrative sections of the report.

Given that this report represents results from the first round of data collection, it presents more of a profile, or a snapshot at a point in time of the surveyed coffee growers rather than a detailed analysis of changes over time. A more detailed analysis of change can inform future studies. Nevertheless, this report captures some interesting findings and results that have emerged from the data analysis.

1.0 BACKGROUND OF THE STUDY

1.1 Coffee Production in Kenya

Agriculture is the backbone of Kenya's economy with the government of Kenya estimating that the sector accounts for about 25.4% of annual GDP and another 27% indirectly from agro-based industries and services with small scale farmers contributing the most. Similarly, smallholder farmers are responsible for more than three-quarters of Kenya's coffee production. There are about 570,000[1] small-scale farmers who have been most affected by the reducing income from coffee because of falling productivity and difficulty in meeting international quality standards. For instance, the production of coffee during Kenya's independence in 1963 was 43,778 Metric Tons (MT) and it substantially increased to a high of 128,926 MT in year 1987/1988. However, following the collapse of International Coffee Agreement in 1989, production of coffee went into a steady decline and coupled with other key challenges, production today is estimated at 42,000 MT[1]. This has significantly reduced the income of small scale coffee farmers with majority of them neglecting the crop.

Smallholder coffee farmers in Kenya own approximately 85,000 hectares out of the approximately 110, 000[1] hectares under coffee. It is estimated that six million Kenyans are employed directly or indirectly in the coffee industry. The major coffee-growing regions in Kenya are the high plateaus around Mt. Kenya, the Aberdare Ranges, Kisii, Nyanza, Bungoma, Nakuru and Kericho among others. The high plateaus of Mount Kenya that have acidic soil provide excellent conditions for growing coffee plants. Coffee from Kenya, which is of the 'mild Arabica' type, is well known for its intense flavor, full body and pleasant aroma with notes of cocoa. This high grade coffee from Kenya is one of the most sought-after coffees in the world.

Conditions favoring coffee growing include:

1. **Temperature** – Coffee does well under temperatures of 14 to 26°C although Arabica coffee can tolerate temperatures of up to 30°C. In Kenya the coffee growing areas experience cool to hot climate ideal for coffee growing. The temperatures average 15°—30°C.

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[1] Coffee Research Institute

2. **Rainfall** – Arabica coffee requires rainfall ranging between 1000 and 2 000 mm per annum. Many coffee growing areas in Kenya receive rainfall of about 1000 — 2000 mm which is well distributed.

3. **Soils** – Most of the growing areas in Kenya have fertile deep volcanic soils which are suitable for coffee. The soils are well drained and are acidic with a pH of between 5.3 and 6.0.

4. **Topography** – The coffee growing areas have undulating landscape with hill slopes as well as gentle slopes. This has ensured well drained and aerated soils.

5. **Altitude** – Most of the growing areas have an altitude ranging between 610 m and 1830 m. However in a few areas like Machakos, coffee is grown at slightly lower altitudes.

6. **Labour** – Coffee growing is labour intensive. A lot of manual labour is required for planting, pruning and harvesting. The dense human population in the growing areas has provided a source of labour.

Coffee Varieties

Coffee Plants come in two main varieties: - Arabica and Robusta

Arabica beans are mild in the cup, with comparatively less caffeine, while Robusta is more aromatic. The Robusta tree appears bushier, the leaves are larger and the berries form in clusters.

Coffee Research Institute (CRI) currently produces five commercial cultivars (varieties) of Arabica coffee. Different varieties are recommended for various altitudes.

- K7 – low altitude coffee areas with serious Coffee Leaf Rust (CLR).
- SL 28 – medium to high coffee areas without serious CLR.
- SL 34 – high coffee zone with good rainfall.
- Ruiru 11 – all coffee growing areas. Resistant to both Coffee Berry Disease (CBD) and CLR.
- Batian – all coffee growing areas.

Production History

Table 2: Coffee Production History

Season	Auction Weight- Kgs	Auction Value $	Direct Weight- Kgs	Direct Value-$	Total Weight- Kgs	Value – USD
1998/99*	67,406,795	159,633,152			67,406,795	159,633,152
1999/20*	85,862,945	144,043,500			85,862,945	144,043,500
2000/01*	65,163,902	89,165,020			65,163,902	89,165,020
2001/02*	47,427,241	73,683,754			47,427,241	73,683,754
2002/03*	58,612,490	76,827,524			58,612,490	76,827,524
2003/04*	52,873,632	87,992,442			52,873,632	87,992,442
2004/05*	49,753,670	120,403,162			49,753,670	120,403,162
2005/06*	47,495,275	128,290,188			47,495,275	128,290,188
2006/07*	53,368,337	143,006,663			53,368,337	143,006,663
2007/08*	39,448,221	139,823,941	2,045,280	8,106,791	41,493,501	147,930,731
2008/09*	51,881,026	160,459,376	1,195,560	4,385,904	53,076,586	164,845,280
2009/10*	36,197,159	171,347,974	3,784,154	19,492,410	39,981,313	190,840,384
2010/11*	33,633,235	221,468,088	2,231,981	22,211,998	35,865,216	243,680,086
2011/12**	43,366,142	190,810,778	5,701,514	33,580,664	49,067,656	224,391,441
2012/13**	38,140,842	127,164,780	3,723,449	17,991,934	41,864,291	145,156,714
2013/14**	40,927,603	174,151,188	8,282,060	42,988,034	49,209,663	217,139,222
2014/15**	35,194,567	143,669,895	6,018,824	31,666,480	41,213,391	175,336,376
2015/16**	30,801,302	117,114,138	5,276,800	32,277,442	37,117,054	161,274,979
2016/17**	34,092,094	159,211,178	6,755,743	43,738,496	40,847,837	202,949,674

Source: CRI Data*, NCE Data**

Though the smallholders have 85,000 hectares out of the 110, 000 hectares under coffee in Kenya, their productivity is very low. Most of the smallholders produce 300-400Kgs/ha of clean coffee while the estates can do up to 1600 Kg/ha clean Coffee. This is as a result of the different farming methods. Large plantations put in a lot of effort on implementation of the good agricultural practices while smallholders face a number of challenges from lack of information to lack of capital, poor climate change adaption measures among others. However, challenges like lack of research capacity and lack of success in developing new resistant high producing varieties is faced by all producers in Kenya.

1.2   Sauti ya Kahawa

The Kenya coffee stakeholders have found it necessary to create a platform with a view to bringing the value chain stakeholders together to deliberate on critical issues and develop a common approach/strategy to address such issues. This idea was actualized with the initial funding and technical support from Global Coffee Platform (GCP), UTZ, Solidaridad (SECAEC) and Africa Fine Coffees Association (AFCA). The platform shall make it possible for the stakeholders to participate in setting the coffee agenda as well as to monitor and track the progress on the agreed plans and goals. It shall also act as the entry point for the development partners and any other organizations willing to work with actors along the value chain in country. The Government, through the Ministry of Agriculture and Livestock and the Department of Cooperatives takes a crucial role in making the platform a reality. The platform, dubbed Sauti ya Kahawa, borrows from Global Coffee Platform, Uganda Coffee Platform, Tanzania Coffee Platform (Mkutano wa Kahawa) and other countries' coffee platform models and experience. The ultimate goal is to create an inclusive and participatory County and National level coffee forum that will bring together all coffee stakeholders to discuss critical issues affecting the sector, resulting in an increase in coffee production and quality in the Country as well as a conducive business environment. As a basis for the improvement of Kenyan coffee producers' profitability, the newly founded Kenyan   National Coffee Platform "Sauti ya Kahawa" and the GCP commissioned a study to identify key areas for action and to identify agreed criteria to determine the cost of production and living income among coffee farmers.

1.3   Coffee Management Services Ltd (CMS) Background

Coffee Management Services Ltd (CMS) is a private limited company owned by East Africa Coffee Co LLP. It commenced operations in 2006 and has operated for 12 years emerging the best coffee marketer in terms of market share. Being an agribusiness firm, CMS provides several services to its clients. These include farm management, pre-financing coffee production, price risk management, marketing, bulk competitively priced farm inputs, project management, environmental audits, sustainability and certification expertise. CMS comprises of 88 employees out of which 30 are senior agronomists.

Over the years CMS have emerged to be the leading coffee marketer, marketing 23 % of the Kenyan coffee. Currently CMS is working with 141 wet-mills and this means approximately 250,000 smallholders in Kenya. These farmers are scattered in all the coffee producing counties in Kenya. The company comprises of highly qualified staff that are equipped with the right skills for coffee productions, project management, Environmental audits and farm management. CMS also manages large farms that cover up to 2,800 ha. The company has been training farmers and has identified most of the challenges facing smallholder farmers: lack of knowledge of soil nutrition, appropriate inputs, inadequate farmers training, lack of market information, unfavourable terms while accessing credit, etcetera. CMS has over 30 are field agronomy liaison officers who do farmers' trainings. CMS has been guiding farmers towards sustainability and more so advising them on how the crop is likely to behave. One of the major activities has been to encourage farmers take their soils for expert analysis so that they may be sure of the nutrients that the soils need to support the coffee tree. This is meant to avoid deficiency or over dose of some nutrients. This has given a wide range of experiences in terms of identifying the factors affecting coffee production , cost of production for coffee, coffee industry policies , production trends , market trends and price trends . The combination of the said factors determines the amount of income realized by the producers.

Previously CMS has partnered with several other partners ranging from local institutions to international institutions. Some of the partners have been other private companies, NGOs, public institutions, government institutions and The Dutch government. These partnerships include; Nescafe plan – Creating Shared Value with Nestle, CSR projects with Tchibo in Germany, Dutch

government in food security, Bill and Melinda Gates, DEG and IDH. CMS is also in Tanzania and Rwanda. It is also offering consultancy services in Ethiopia.

1.4   Stakeholders' Consultative Forum Consensus

A consultative meeting was held at the beginning of the study to get stakeholder input which involved methodology and data collection. See picture below:

Figure 3: Stake Holders Consultative Forum

2.0   LITERATURE REVIEW

Economic viability for farmers has been an area of interest over the years. Numerous studies on crops viability have been done around the whole world. A study conducted by Joni Valkila of Institute of Development Studies was to evaluate the viability and advantages of Fairtrade organic coffee production and trade in the case of the Nicaraguan small-scale farmers. This study indicated the economic advantages of growing coffee are not always clear though Fairtrade organic coffee production can increase farmer income in the case of low-intensity coffee production. It was however noted that more intensive Fairtrade organic Coffee production can yield benefits through premium but still yields tend to be lower compared to conventional methods. The study further noted that when the conventional prices are low, Fairtrade prices will be a bit high. The conclusion was that it's hard to determine the viability of Fairtrade organic Coffee in Nicaragua since the prices are not stable.

A study conducted in Colombia (2007) by the Global Coffee Platform (GCP) on Coffee Economic viability indicated that farmers were not producing optimally. It was noted that the farmers were producing 300 kg green / ha and could be increased by 65% on average. 70 % of the coffee growing population was producing below the average. This meant that they were not viable. The study noted that among the factors affecting coffee viability include poor agronomic practices, cash flow issues, lack of training, very old trees among others. If the above issues could be solved, the study indicates that it would be possible to increase productivity by 25%.

Another study conducted in Colombia by International Coffee Organization in 2016 indicated that the coffee revenue could only cover variable costs and thus the operating profit was positive. However the long-term viability of Coffee was uncertain since the revenues would not cover full costs of production i.e. variable and fixed costs. The study also mentioned that if the established cost of 10 million COP/ha was brought into the picture and spread over 8 year's lifetime, the situation worsens. There were only four crop years out of the 10 years that were studied that had the total profits greater than or equal to zero.

The same study noted that the scenario in Costa Rica is more or less the same with Colombia in terms of   cost of production. Costa Rica had very high prices and thus the revenues would cover

the costs comfortably in the case of 2005-2011. However, in 2012 the prices dropped drastically and farmer incurred losses. This is a clear indication that coffee viability depends to some extent on the prices though it's a combination of cost management and optimal production.

In El Salvador , the same study indicated that the costs were taking an upward trend up to 2012 but in 2013 there was a leaf rust outbreak that affected the crop adversely and this resulted to reduced labour cost and eventually a drop in the cost of production from 1400 USD/ha to 1300 USD/ha. On the other hand, the prices decreased and this led to 50% decrease in revenue again threatening the viability of Coffee. As result, it was expected that most of the farmers would move from Coffee to cocoa production. In Brazil, contrary to other countries, the study showed positive profits both in Arabica and Robusta cases. Even when the establishment costs were brought into account, the profits were still positive, an indication that Coffee farming was viable in Brazil then.

In Africa, a case study of coffee growing association conducted in Rwanda indicated that coffee growing would only be profitable if the specialty market buys that coffee. However, this study had limitations since it studied only on farmers' association.

A study conducted by TechnoServe for GCP (2017) indicated that production for smallholders was as low as 300 kg green/ ha with potential for a 65% increase in average yield. However the potential may be lower for regions with poorer soil and older trees. The study mentioned some of the key levers for yield improvement as farm rejuvenation, training in GAPs and targeted fertilizer and pesticide application. The study also foresaw an opportunity for a 144% increase in profitability for farmers, which translates into an estimated $55m annual potential value across the 571,000 smallholder farmers.

Sector study conducted by Agri-Logic for GCP (2016) on sector reviews of Angola, Burundi, Cameroon, Côte d'Ivoire, Ethiopia, Kenya, Rwanda, Tanzania and Uganda indicated that in most African origins, yields are low, quality is inconsistent and supply chains are inefficient. The study indicated that coffee production has really reduced in Côte d'Ivoire, Zimbabwe, Congo (Brazzaville), Gabon Zambia and the Central African Republic. However, a positive trend in growth was noted in Kenya, Tanzania and Rwanda since supply over the past 5 years is positive. This study noted that farming household income was below poverty line in all of the African coffee origins. This would mean coffee farming is not viable but with proper investment, farmer training,

rejuvenation/replanting, input supply, improvement of processing capacity, access to credit and farmer organization capacity building, the study noted that productivity can improve making coffee viable in these countries. This study further suggested that the bulk of the investment should be on farmers' training and input supply.

Strategic Literature Review study on coffee production costs and farm profitability conducted by Specialty Coffee Association (2016) indicated that there was a highly significant correlation between profitability and production cost per kilogram. This was based on the understanding that profitability is the value of guaranteed price against production costs. The study also showed that production costs per kilogram and yield are not correlated and neither are production costs per kilogram versus costs per hectare correlated. This means that the extra cost invested per hectare would not automatically be compensated by achieving extra yield.

A study by True Price, commissioned by Fairtrade International (2017), "Assessing Coffee Farmer Household Income" indicated that farmers in Indonesia relied highly on income from coffee production whereas farmers in Kenya relied mainly on other sources of income. On average about 50% of farmer household income resulted from coffee production. The other large contributors were income from other farm goods and off-farm wage income. Indonesian and Vietnamese farmers had the highest farmer household incomes, which was mainly due to relatively high incomes from coffee. Indonesian farmers had the highest coffee profitability, which resulted from relatively low costs of production. Tanzanian farmers also had a high profitability per kilo of coffee, but this did not translate into high farmer household incomes due to relatively low coffee production volumes. Moreover, Tanzanian farmers had almost negligible in-kind farm income and income from off-farm activities. While some Kenyan farmers were making a profit on their farms, the overall picture is very mixed, so that on average, Kenyan farmers were making losses on coffee production. The results of this study were placed on the living wage concept and it was found that on average Indian, Indonesian and Vietnamese farmers earned a household income, but only Indonesia farmers earned a living household income from coffee production alone. Twenty-five percent of Indian farmers, almost 50% of Indonesian and Vietnamese farmers and 100% of Kenyan farmers could not earn a living income. An additional 'value added analysis', showed that farmers were able to provide their households and their hired workers with a living income from coffee

production in India and Indonesia. In Kenya – where farmers made losses on coffee production – and Vietnam, that was not the case then.

2.1   Definitions

Economic Viability

Economic viability means that the real returns from farming operations relative to the farm's asset value and labour inputs are competitive compared to other alternatives. Farming is the defining characteristic of a farm; it must succeed on that basis in order to be viable.

Estate Farmer Economic Viability

Economic viability in the case of an Estate farmer refers 11.16% risk free rate (one Year Treasury Bill) plus annual average inflation rate of 5% plus a return on tax of 30%, all this summing up to around 22%. This means that economic viability of this farmer shall be a Return on Investment of above 22%.

Smallholder Farmer Economic Viability

Economic viability in the case of a smallholder farmer refers to the ability and capacity of a farm to 'make a living'. This shall be influenced by ability over time of the farmer to apply good agriculture practices that enable them to continually produce above their cost of production and earn at least the living wages as given by Anker and Anker (2015).

Profitability

Profitability is defined as the ability of the farmer to produce a return on an investment based on their resources in comparison with alternative investments.

Profit

Profit is a measure of the financial performance of the farm. It is computed as total revenue less total expenses incurred by the farmer. Although the farmer may realize a profit, this does not necessarily mean that their coffee growing is viable.

Living Income may be defined as:

- The level of wages sufficient to meet the basic living needs of an average-sized family in a particular economy, (ILO).

- The remuneration received for a standard work week by a worker in a particular place sufficient to afford a decent standard of living for the worker and her or his family, Social Accountability International, (SAI).

- Income sufficient to pay the bills, buy enough food, handle emergencies and stay off welfare, (Black's Law Dictionary)

Elements of a decent standard of living include; food, water, housing, education, health care, transport, clothing and other essential needs including provision for unexpected events.

A study conducted by Anker and Anker (2016) on Living Wage Report in Kenya with a focus on rural Mount Kenya Area has placed the living wage at **KShs.13, 193 gross per month.** The same author had in 2014 done a study on living wage for Lake Naivasha flower growing area and currently tags it at KShs. 22,104 gross per month after adjusting for inflation and taxes for the period from 2014 to 2016.

Costs of production include:

- What the farmer has to give up as they venture into the coffee farming. It is the necessary investment needed to initiate the production process and keep it going.

- All the farm level cash outflow costs, selling costs, implicit costs for activities done by the farmer himself, the farmer's time spent in the farm and the interest income forgone by committing the capital resources into the farm, transport, administrative, financing and security costs.

- Cost of production goes with the scale of production derived from economies of size. Bigger farms have advantages over smaller farms. However, due to scale drawbacks, it is not easy to determine the optimal size especially with the concept of diminishing returns that often affect large scale farms.

A few definitions were also borrowed from Ha *et al* (2006);

"Profit is a measure of receipts less costs. Economists split costs into two broad categories, those that vary with output (variable costs) and those that do not (fixed costs). Different profit measures use different definitions of 'receipts' or 'costs'. For example, some profit measures — like farm gross margin — take account of variable costs, but exclude fixed costs. Profit will change when something affects either receipts or costs. For example, an output price change will alter profit because it affects receipts (price of output times the quantity of output). If costs stay constant and output price rises, then by definition, profit will rise.

Productivity is a measure of the units of (physical) output that can be produced from a given amount of (physical) inputs. We can most easily measure productivity when a production process requires only one input and one output. Productivity will not be affected by a change in output price, because price is not part of the productivity equation; a change in output price does not affect the ability of the farm to transform inputs into outputs.

Prices (of inputs or outputs) will affect profit, but they will not affect productivity. However, technical change (via research or other means) will affect both productivity and profit since it affects the ability of farms to convert inputs to outputs (productivity) and hence affects receipts (output price times output quantity) or costs (input price times input quantity) or both. Farmers are concerned with profit because it provides the means for current consumption (food, clothing, education, etc.) and investment. They are concerned with productivity to the extent that it helps them create higher profits, or to counter the inexorable cost-price squeeze. Research administrators know that for an industry to survive, it has to continually improve its productivity. Otherwise, international competition will displace domestic production on the world market and at home. This could lead to the demise of an industry, (Ha *et al*, 2006, pg.9)"

2.2   Field Agronomy

The stakeholders agreed that the study would assume that the farmers have mature coffee trees. The cost areas were to comprise the below areas;

Pruning

Pruning literally means removing superfluous parts of a tree. It is therefore a very large field of operation. To be more precise, it is necessary to refer to pruning in its separate operations: Conversion and first pruning, main pruning, handling, de-suckering and chimney opening.

Weed Management

Weeds are plants growing in a farm where they are not wanted. They pose a threat to the crop as they compete for nutrients and water as well as harbor pests that may pose harm to the crop. Weeds are characterized by very fast proliferation and can be a nuisance to control as they can interfere with coffee management practices like fertilizer application.

Weed Control methods are the methods applied to suppress growth of the weeds or to eradicate the weeds from the coffee field. They are both preventative and eliminative in nature. Weeds control should be carried out whenever weeds are spotted especially during the wet weather and should be a continuous activity to suppress their growth. The methods are classified into:

- Mechanical
- Chemical
- Cultural

Major Pest and Diseases

Diseases

The major coffee diseases are fungal and bacterial. They include:

- Coffee Berry Disease(CBD)
- Coffee Leaf Rust(CLR)
- Bacterial Blight of Coffee (BBC) being the only major disease caused by bacteria.

Other diseases include:

- Fusarium root disease
- Fusarium bark disease
- Brown eye spot disease
- Botrytis warty disease.

Pests

The major pests in coffee include:

Pest Type	Economic Injury .Level
Antestia	2 per tree
capsid bug	4 tree
Berry borer	10 adults
Leaf skeletonizers	20 per tree
Giant loopers	10 on suckers,20 on adults
Thrips	2 per leaf
Leaf miner	35 moths per tree
Scales	10% in inspected area

Economic injury level refers to the smallest number of insects (amount of injury) that will cause yield losses equal to the insect management costs

Coffee Nutrition

Nutrients are classified into Micronutrients and Macronutrients.

Macronutrients are those nutrients required in large and sufficient amounts and as such their availability in less quantities result in nutrient deficiency disorders.

Foliar Feeds

They supplement ground applied fertilizers as well as supply micronutrients especially Zinc, Boron and magnesium.

They are beneficial especially to plants carrying a heavy crop and in situations where the plant is unable to absorb nutrients especially in dry seasons. The foliar should be applied when the temperatures are low to prevent berry and leaf scorching.

Manures in Coffee

Application of organic manure to coffee is of utmost importance because manure contains the major nutrients required for plant growth.

Manure as well, increases microorganism activities in the soil thus promoting nutrient availability.

They suppress weeds and moderate soil temperatures. They also improve soil structure and improve water percolation.

Manure should be applied at a rate of 1-2 debes[2] per hole during planting and yearly on mature trees. This will greatly improve the soil nutrient profile and increase coffee production immensely.

Coffee Harvesting

Coffee quality is made in the field through the various agronomic activities carried throughout the growth stages till maturity. To maintain the quality of coffee, it is essential that all stages are followed and carried out as per the recommended procedures. Coffee harvesting begins when the berries begin to ripen by turning red over at least 75 % of the surface.

This is achieved approximately 8 months after first flowering. Picking is the first operation towards processing as it entails the removal of the ripe cherries from the coffee trees for processing. It is during picking that the initial standard for quality is maintained through selective picking and sorting

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[2] *Debe is a 20 litre can.*

Coffee Processing

Coffee processing is a critical stage from a quality maintenance point of view. It involves a series of stages each of which has a distinct purpose. Good cherries from the farm may be spoilt if processing conditions are not properly managed. There are three methods of processing namely: wet processing, dry processing and honey processing.

Wet processing method involves pulping of cherries, fermentation then drying. This method gives better quality coffee and as such is the main method used in Kenya. It is so called because most stages require use of water.

Dry processing is also known as "mbuni"[3] drying. It involves harvesting and drying the cherries without pulping.

The third method of processing is a new method that is being adopted in Kenya. Honey processing involves only picking the perfectly ripe cherries which are pulped without water. The parchment is then dried with the mucilage still fully attached.

2.3   Revenue Determination

Revenue was calculated as per the below:

Total yield per tree (kg of cherry) multiplied by Price per Kg of cherry

2.4   Cost of Production

In our case, the costs of production included all the farm level cash outflow costs, selling costs, implicit costs for activities done by the farmer himself, the farmer's time spent in the farm and the interest income forgone by committing the capital resources into the farm, transport, administrative, financing and security costs.

Cost of production goes with the scale of production derived from economies of size. Bigger farms have advantages over smaller farms. However, due to scale drawbacks, it's not easy to determine the optimal size especially with the concept of diminishing returns that often affect large scale farms.

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[3] Mbuni refers to the Cherries that are dried without the removal of the pulp

3.0   METHODOLOGY

3.1   Coffee Economic Viability Study Background

In order to be able to understand the question of coffee economic viability in Kenya, the Kenya National Coffee Platform "Sauti ya Kahawa" commissioned a study to identify key areas for action and identify agreed criteria to determine the cost of production and living income among coffee farmers. The objective of the study was to identify and pilot key criteria to determine the cost of production, profitability and living income among coffee farmers, which would be agreed among Kenyan coffee stakeholders and endorsed by the Kenya National Coffee Platform, to be used as a national standard for farm economy assessments and to inform further areas of action. This study focused on coffee growers across the country.

3.2   Stakeholders' Consultative Forum Consensus

According to Agriculture and Food Authority (AFA), the smallholders are about 570,000 farmers (grouped into about 600 Farmer Co-operatives). An estimated 3,850 farmers are in coffee estates. These smallholder farmers produced 27,230 metric tons of coffee out of 40,848. This was 65% of the total Kenya coffee production in the year 2017.

It was agreed that the sample size would thus be composed of 65% farmer co-operatives and 35% from estate farmers. The sample on farmer co-operatives would be further broken down into wet mills from where the smallholder farmers to be sampled would be drawn. The sample used 3 criteria, sampling error being at 5% significant level and 95% confidence level meaning that 95 out of 100 samples would have the true population value within the range of our precision.

The following explains how the sample size was obtained.

The assumptions made were as follows:
- We do not know the variability in the proportion that will adopt the generic coffee farming Good Agricultural Practices; therefore, assumed p=.5. (the maximum variability in a population)
- The coffee growing farmers is a large population by the definition of **Cochran** (1963:75) and hence uses his equation as below to determine a representative sample for proportions.

Where:

Equation 1: $\quad\quad\quad\quad\quad\quad n_0 \quad\quad = \quad\quad\quad \dfrac{Z^2 pq}{e^2}$

n_0 is the sample size

Z^2 is the abscissa of the normal curve that cuts off an area at the tails (1 - equals the desired confidence level, e.g., 95%). The value for Z is found in statistical tables which contain the area under the normal curve, e.g. $Z = 1.96$ for 95 % level of confidence

e is the desired level of precision implying the acceptable sampling error

p is the estimated proportion of an attribute that is present in the population

q is **1-p**

A total of 540 farmers were sampled on stratified sampling method on the basis of 65 % for smallholder and 35 % for estates. Each county was allocated a sample size based on the average volumes produced and sold in the NCE for the previous 3 years. Each county sample size was further grouped into estates and farmer co-operatives following the established ratio. Interviews conducted randomly for each of the groups. This is to say that counties that had below 1% of the three year average national production were not viable for the study. This formed part of the study limitations.

The average national market price was based on clean coffee data obtained from the NCE market reports for the season 2016/17. Cost of production for the wet mills was obtained from Producer Crop Returns (PCRs) that are maintained by the wet mills and filed with the Ministry in charge of Cooperatives.

It was also agreed that data collection would be done through face to face interviews, observations, documents and records review.

4.0   DATA ANALYSIS AND FINDINGS

This report presents the results of the analysis of the data collected for the coffee economic study in all coffee producing counties across the country in March 2018. This study consisted of in-depth interviews with a target 540 coffee farming households. The primary counties in which the sample was targeted are based on the contribution to the national production as shown in the following figure:

Figure 4: National Production Distribution Overview
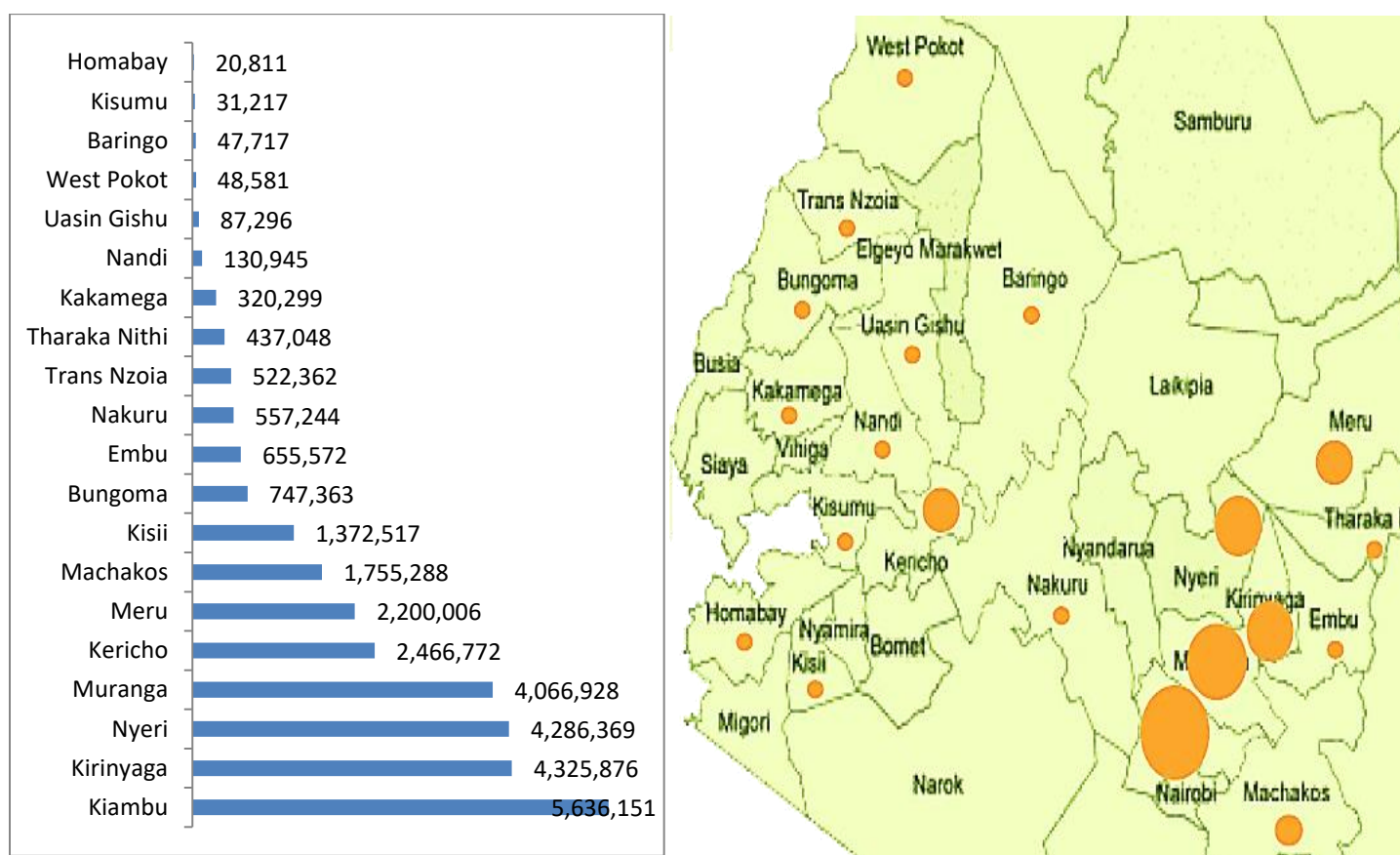
Source: Author's Graphs using NCE data

The sampled estates, smallholders and wet mills were selected randomly in the respective counties. The counties and the numbers of their coffee farmers actually surveyed and their percentage of the respondents sampled is as follows:

Figure 5: Coffee Growers Sampled in each County
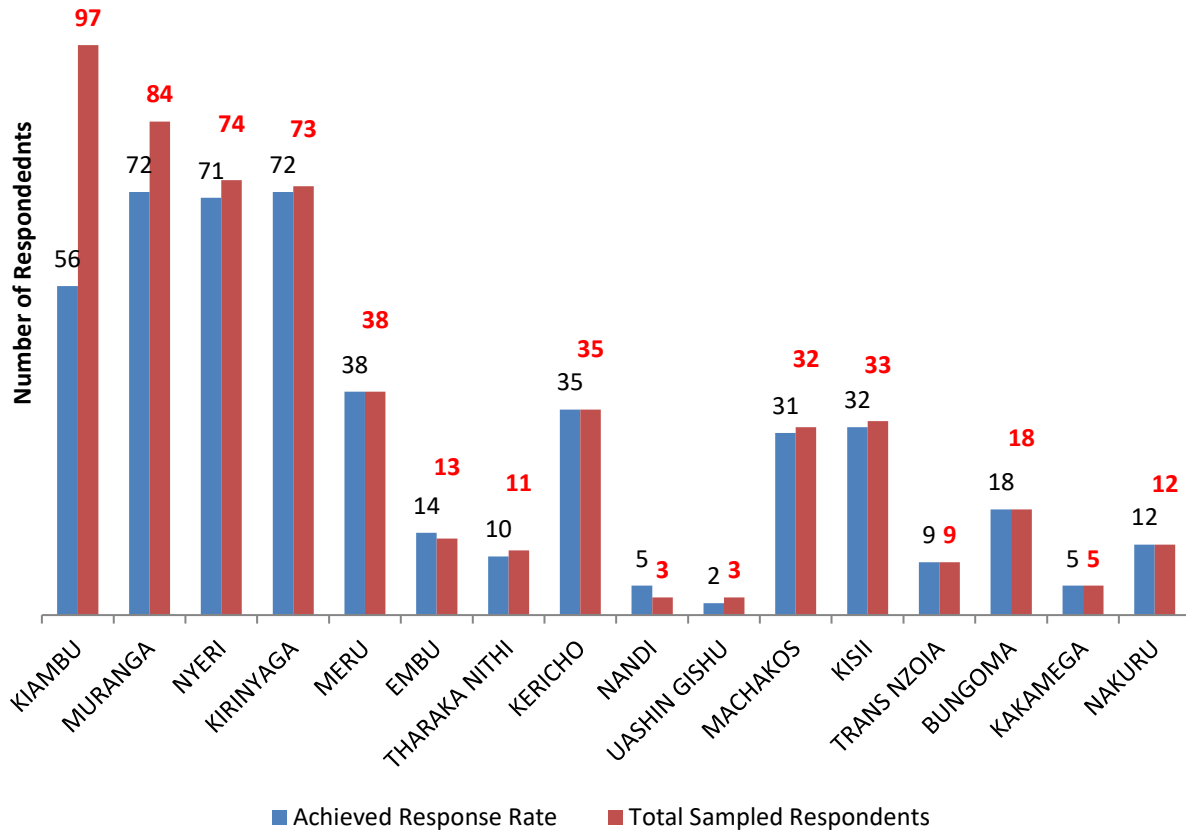
A total of 495 respondents were interviewed in different counties in coffee growing areas. However, after cleanup of the data the respondents whose information is used in data analysis is as shown below:

Table 3: Coffee Growers that participated in the Study

County	Number of Smallholder farmers	Number of Estate farmers	Number of Wetmills	Achieved Response Rate
KIAMBU	26	27	3	56
MURANGA	48	21	3	72
NYERI	61	5	5	71
KIRINYAGA	66	2	4	72
MERU	32	2	4	38
EMBU	10	2	2	14
THARAKA NITHI	9		1	10
KERICHO	29	2	4	35
NANDI	2	1	2	5
UASHIN GISHU	1		1	2
MACHAKOS	26	1	4	31
KISII	26	2	4	32
TRANS NZOIA	4	3	2	9
BUNGOMA	13	2	3	18
KAKAMEGA	3	1	1	5
NAKURU	7	2	3	12
	363	**73**	**46**	**482**

All participants selected for the study were growing coffee and indeed made a contribution to the national coffee volumes as per the NCE transaction listing reports in the season 2016/17. Because quantitative analyses alone cannot provide the in-depth understanding of the livelihood systems employed by the coffee grower, this quantitative study is supplemented by a series of (qualitative) discussions captured in the narrative sections of the report.

Given that this report represents results from the first round of data collection, it presents more of a profile, or a snapshot at a point in time of the surveyed coffee growers rather than a detailed analysis of changes over time. A more detailed analysis of change can inform future studies. Nevertheless, this report captures some interesting findings and results have emerged from the data analysis.

The interviews were conducted in a large number of randomly selected coffee growers in the participating counties. Typically, farmers from various zones in the different counties were

interviewed. The data presented here represents a profile or a snapshot at a point in time of the interviewed coffee growers rather than an analysis of changes that have taken place.

A map of Kenya showing the coffee growing areas in Kenya is presented in Figure 6 below.

Figure 6: Map of Coffee Growing Areas in Kenya

4.1   Site Selection and Sampling

The counties where interviews were to be conducted were agreed upon. The decision on how many farmers to sample in each county was based on their contribution to the national volumes as

available in the Nairobi Coffee Exchange (NCE) 2016/17 Report. In each of the counties, the coffee growers to be interviewed were randomly selected.

The farmers selected in the sample met the following criteria:
   a. Must be a coffee producer.
   b. Must be active i.e. have contributed to the national volume in season 2016/17.
   c. Must be a member of the society for smallholders.
   d. Must have delivered coffee to the respective FCS.

4.2   Data Collection and Analysis

After the respondents were identified, questionnaires were administered by the enumerators capturing various areas of interest. The data collection was carried out between 26th February 2018 and 16th March 2018 on the targeted 540 coffee growers across all coffee growing counties of Kenya. The data was entered, edited and analyzed using Microsoft Excel and is presented in various forms such as graphs, tables, pie charts and others in this report.

Some of the conventions used throughout this report include the following:

• For ease of reviewing some of the results, percentages in figures and tables of results are usually rounded off to the nearest whole percent. This means that occasionally the sum of percentages in a table row or column or discussion in the text will not add up to exactly 100%

• Unless otherwise explicitly stated, missing cases and clearly erroneous outliers have been excluded from the tables and figures. There are two reasons for this: (1) to avoid statistical distortion of the results due to unrealistically large and/or small values and; (2) to improve the clarity and details in some figures by reducing the ranges of the data considered. The accompanying narrative indicates the ranges of the variables considered as being valid as well as the number and/or percentage of the total number of surveyed coffee growers (540) that are represented in these tables and figures.

• Some other numbers presented in the various tables throughout this report that have smaller magnitudes may also be rounded off to either the nearest whole number or nearest one-tenth percent unless otherwise stated.

• In order to protect the proprietary and confidential data of the Farmers, the vast majority of the data presented in this report have not been disaggregated by farmer units.

4.3 Results and Findings

The respondents (coffee growers) were sampled from various counties across all the coffee growing counties of Kenya where the survey was conducted.

The remainder of this report is organized into sections, where each section presents the analysis of the baseline data relating to various aspects of interest. These sections and their subjects are as follows:

- Section 4.3.1 - 4.3.4: Social Economic and Demographic Characteristics
- Section 4.3.5 - 4.3.8: Production revenues and costs
- Section 4.3.9: Sensitivity Analysis

4.3.1 Age of the Farmers

Figure 7: Age Distribution of Coffee Growers Surveyed by Percentage
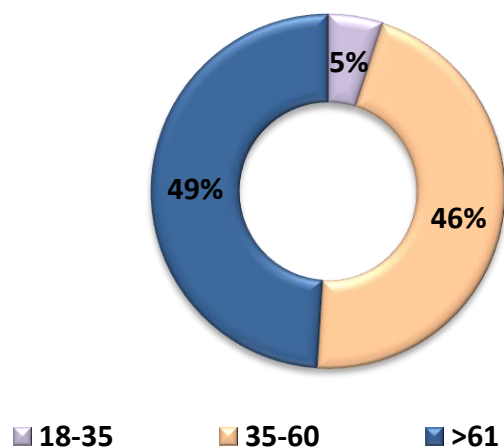
Out of the 363 smallholder farmers surveyed, 177 farmers were above 60 years (the government retirement age) which represents about 49%. This is not a surprising trend as coffee is popularly known as "an old man's crop". It is also in line with earlier project literature review that indicated that very few youth are involved in coffee growing. However, this data reaffirms the great need for youth engagement and integration interventions to generate interest in coffee and more

importantly to get them engaged in active coffee growing. Only 19 farmers were under the stipulated youth age bracket of 35 years representing only about 5%. The low involvement of youth in coffee farming could be explained by different reasons including the fact that some of the counties like Kiambu are closer to the capital city of Nairobi and so most of their youth have migrated there in search of jobs hence not involved in coffee growing. It could also be that there is a general trend by the older folk not to pass along the coffee farming activities to the younger generation. Competing enterprises including horticulture, dairy, and business could also be more attractive for the youth compared to coffee farming.

When we drill down to the counties, we observe that the trend of old farmers is a common occurrence across all the coffee growing counties regardless of the contribution towards the national production which informed the number of growers to be sampled in each county as shown in Figure 1.4 below. This further builds the case that the issue of youth integration in coffee growing is a national issue rather than a regional one.

The average age of the coffee growers who participated in the study is 62 years across all the counties surveyed. We put an upper age limit of 100 years and a lower age limit of 18 years to eliminate outliers in analyzing the data.

Figure 8**:** Average Age by County
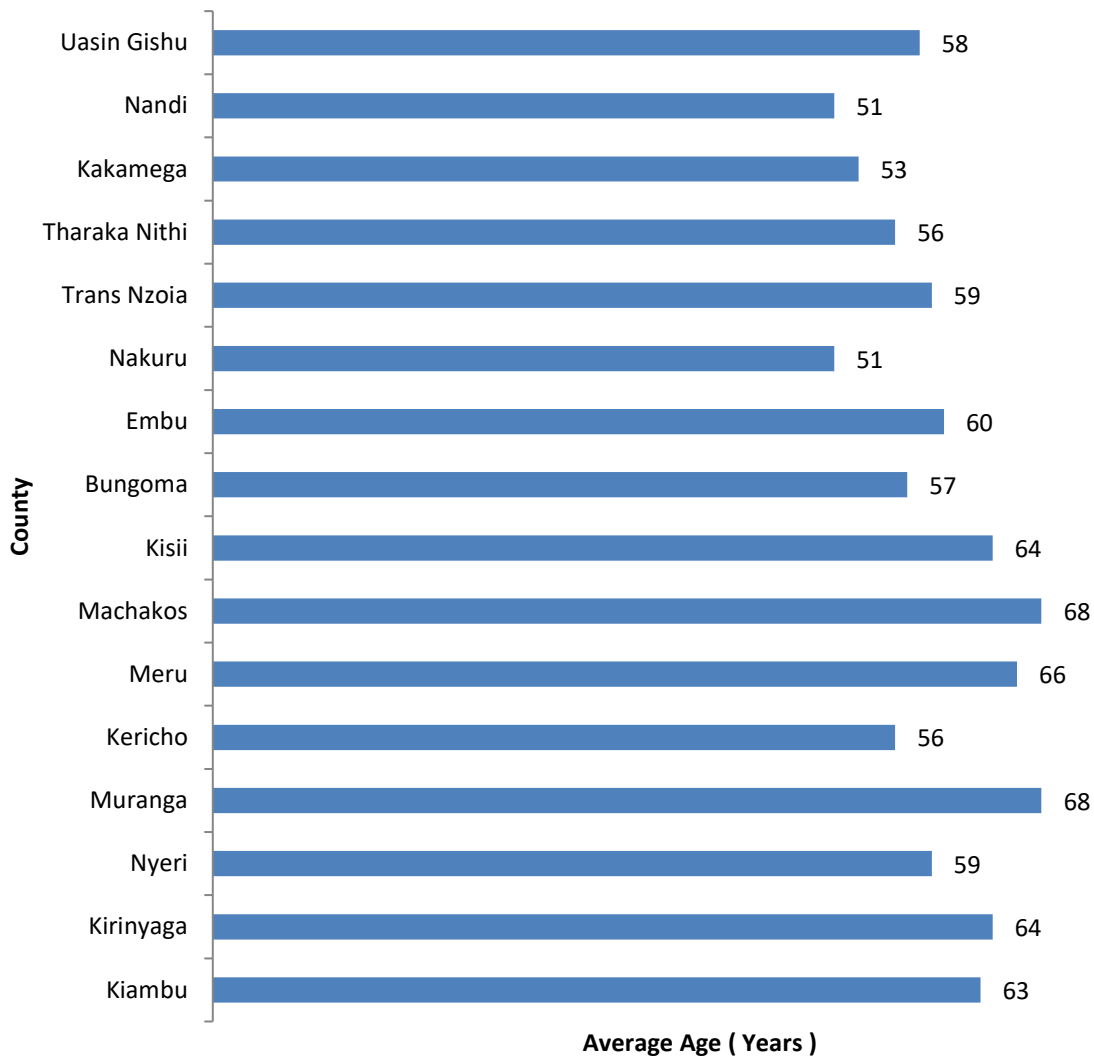
4.3.2   Gender and Coffee Growers

Coffee is pre-dominantly considered a male crop and the results of the baseline survey seem to support this hypothesis as shown in Figure 9. Although women and youth provide most of the labour on the coffee farms, ownership and decision making remain with the male in the household. As highlighted in the literature review, women have been excluded in areas of training, leadership positions and decision making. This has resulted in a big gap between training and implementation resulting in low rates of adoption of Good Agricultural Practices. Most of the studies also noted that there is a positive correlation between women and productivity and therefore recommends women inclusion in coffee farming or employment of the household approach.

Figure 9**:** Gender of Coffee Growers who participated in the Study
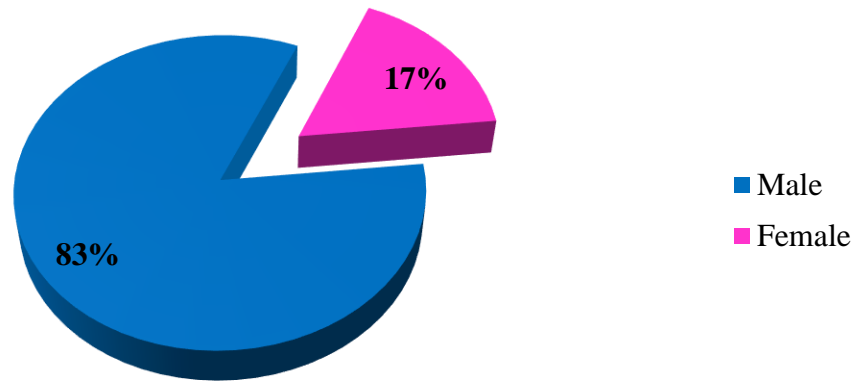
Only about 17 percent of all respondents interviewed across the coffee growing counties and across estates and smallholders are female. This is in line with the literature review on gender in the coffee sector that shows low women involvement. There were only 2 female estate owners from the total 73 estates interviewed which is only about 3% as shown in Fig 10. This could be explained by the fact that most estates are passed on to the next generation and with a patrilineal inheritance system then the estates tend to be passed onto the sons. Among the smallholder coffee growers interviewed, 20% were female. This could be explained by the fact that for the smallholders, we used the member registration documents at the cooperatives level. In some household the male work away from home so the women are the ones who have a member number in the cooperative. Also, there are a number of widows who have taken up the numbers of their spouses at the cooperatives. Based on these observations, the higher number among smallholders should be understood as growing and delivering coffee at the cooperative and not necessary an indicator to coffee farm ownership.

Figure 10: Gender Distribution across different Farmer Archetypes
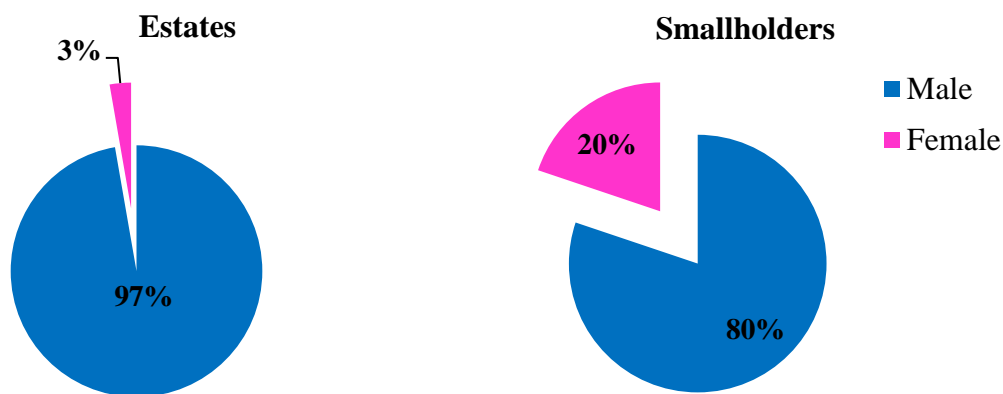
4.3.3   Level of Education

The education level of the head of the household could have a significant impact on their ability to profitably run a coffee farming business .This may be due to their literacy level (their ability to assimilate written manuals and other materials). Other factors may explain the strong correlation seen between their education level and the impacts of a project on their specific household. The coffee viability study interview asked about the highest educational achievement by respondent. These results are presented in Figure 11 and show that, most of the farmers interviewed (66%) have attained basic education which is the secondary school level as currently set by the government of Kenya.

Figure 11: Education Levels of the Coffee Growers Interviewed
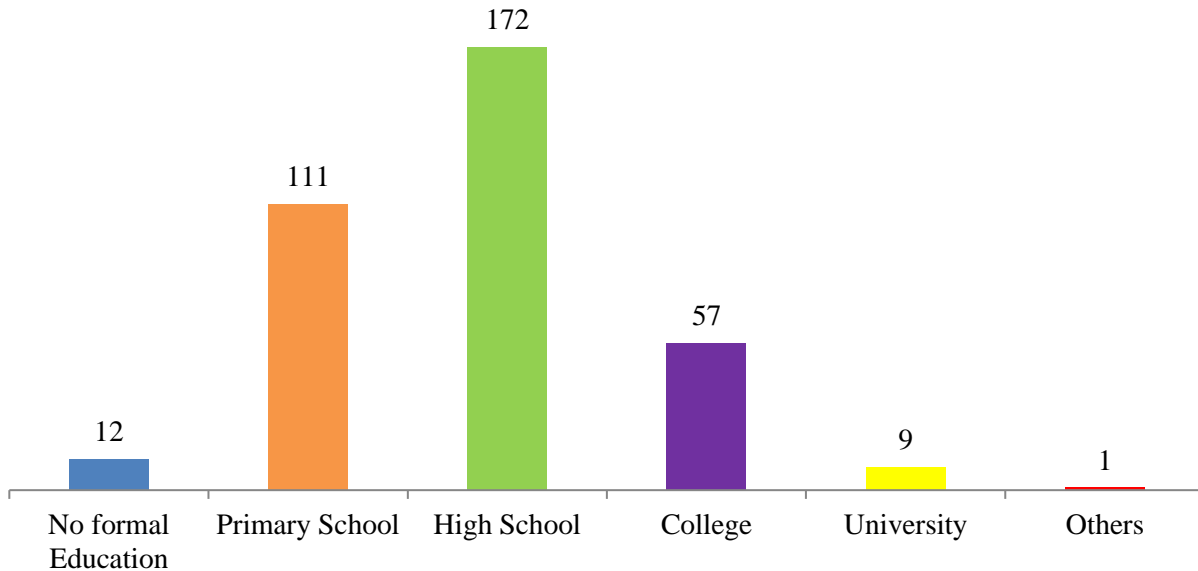
4.3.4 Household Size

The average size of the household of the coffee growers interviewed is 6 people with average of 3 males and 3 females. The households have an average of 2 children and the other 4 being adults including children above the age of 18 years. Although the primary activity from most of the coffee growers interviewed is coffee, they also engage in other major activities including other cash and food crops and dairy farming.

4.3.5 Production

Estate Production Weight in Kilograms of Cherry per Tree

The production per tree for the Estate has minimum production 1.40 kilograms and the highest production is 16.41 kilograms of cherry. The below graph demonstrates the production levels of the sampled respondents at the estate level. The highest proportion was producing an average of 4-7 kilo of cherry per tree while 15% were below 2 kilos. It is worth noting that 23% were doing above 10 kilos per tree.

Figure 12: Estate Production Weight per Tree
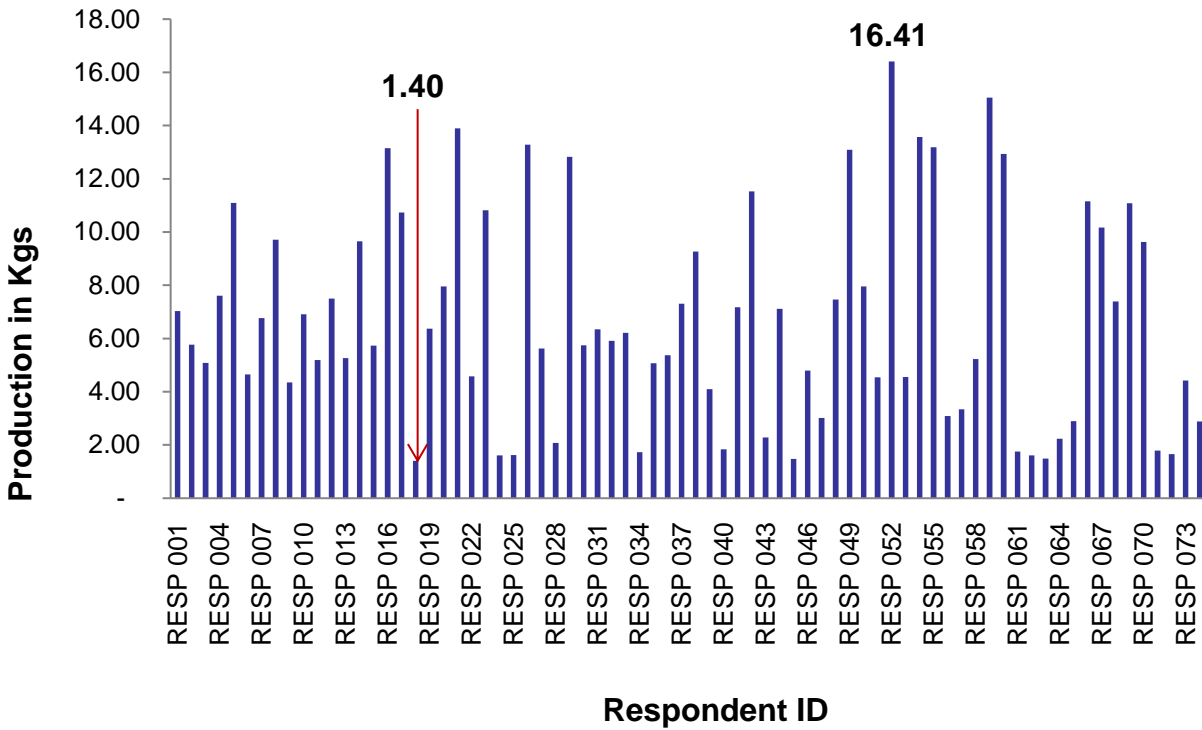
Smallholder Production Weight in Kilograms of Cherry per Tree

The production per tree for the smallholder farmers has minimum production of 0.13 kilograms with the highest production being 15.55 kilograms of cherry. The varied production levels are due to various factors such as financing difficulties, inputs unavailability and difference in varieties among others. The next graph demonstrates the production levels of the sampled respondents at the smallholder farmers' level. It's worth noting that 3% was doing above 10 kilos compared to the 23% production level for the estate level.

Figure 13: Smallholder Production Weight per Tree
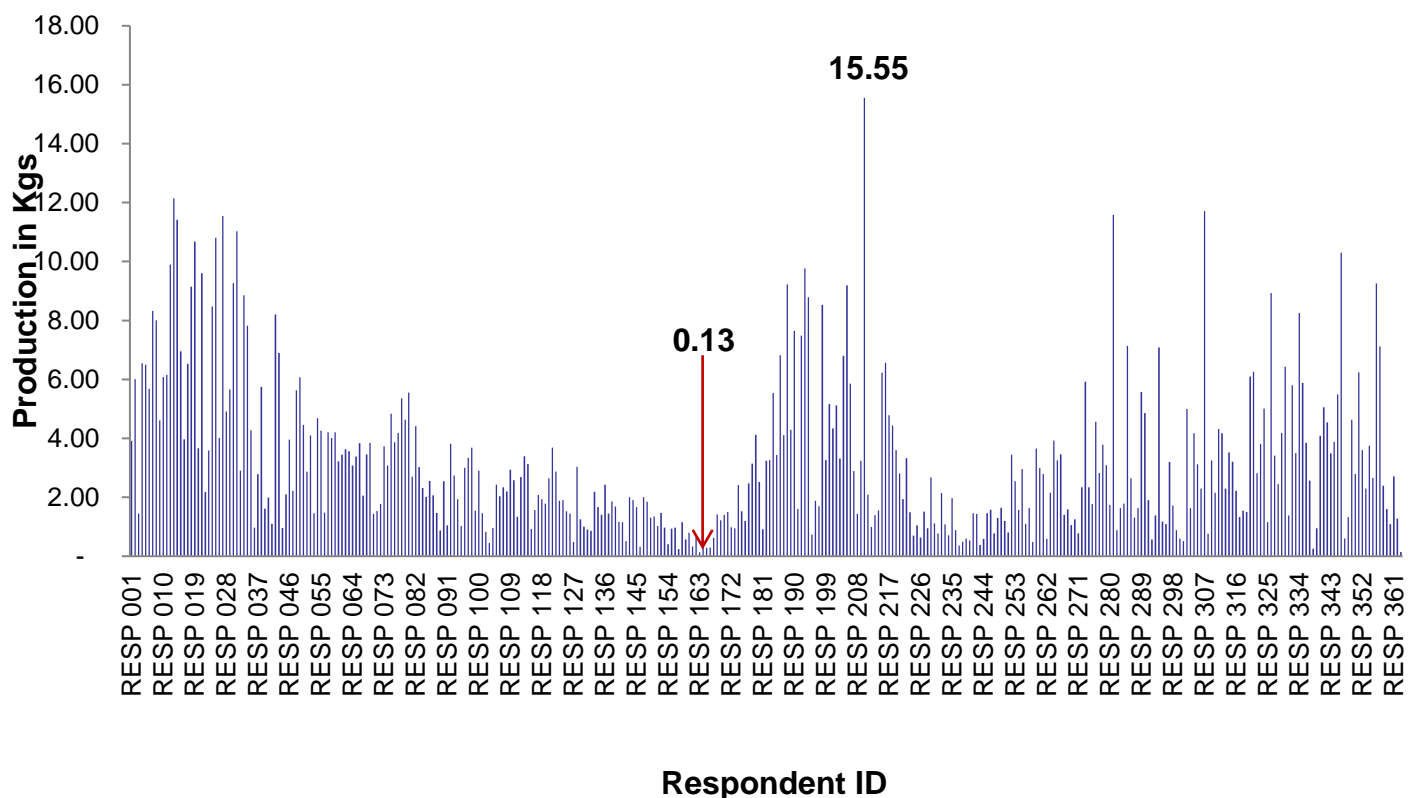
4.3.6 Cost of Production

Average Production Cost for Estate Farmers

The production costs have labour cost components (pruning, weed control and picking) as the main cost components for both estates and smallholder farmers. The estates have additional costs being administration and processing costs forming part of major costs for the estates but not found in the smallholder farms. The cost components are on average moving down depending on production level for both estate and smallholder farmers.

From the raw data, the cost of production per kilogram of cherry had a high of KShs. 96.52 and a low of KShs. 30.48 for the estate farmers. The variations in the costs are due to different farming scales. Estate farmers are categorized in small, medium and large estates. They thus have varied levels of adoption of Good Agricultural Practices. Other factors include labour, input costs, coffee varieties among others.

The following chart shows the average cost of production per Kilo of cherry across the bands, with the costs distributed as shown. Picking and nutrition costs take the highest proportion of the cost.

Figure 14: Estate Farmers Production Cost per Kilo`
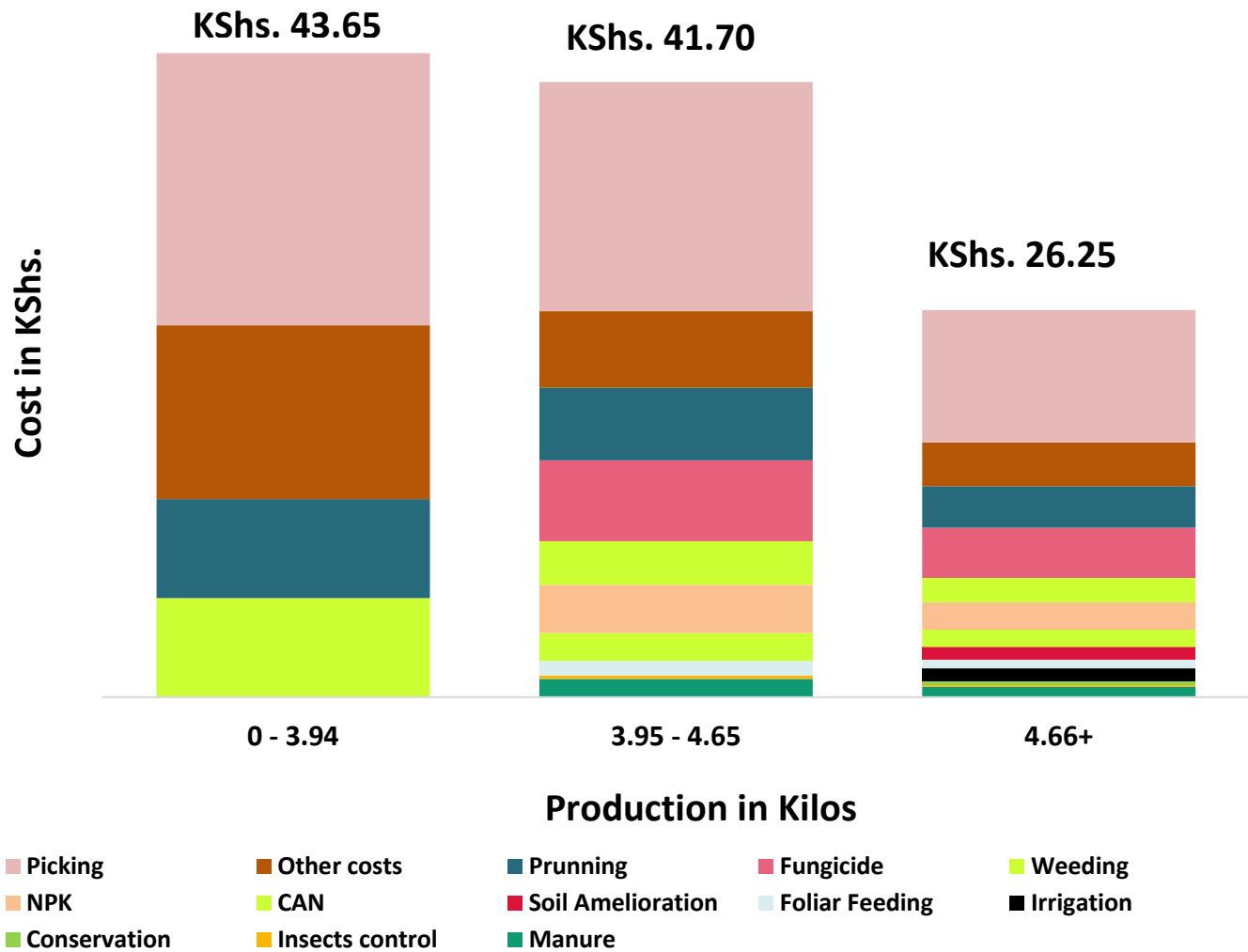
The cost components are on average moving down depending on production level for both estate and smallholder farmers.

Average Production Cost for Smallholder Farmers

Cost factors include labour, input costs, coffee varieties among others. The below chart shows the average cost of production per kilo of cherry across the bands, with the costs distributed as shown. However, the bulk of the costs are in picking. From the below, the smallholder farmers seem not to invest much in pest and disease control and nutrition.

Figure 15: Smallholder Farmers Production Cost per Tree
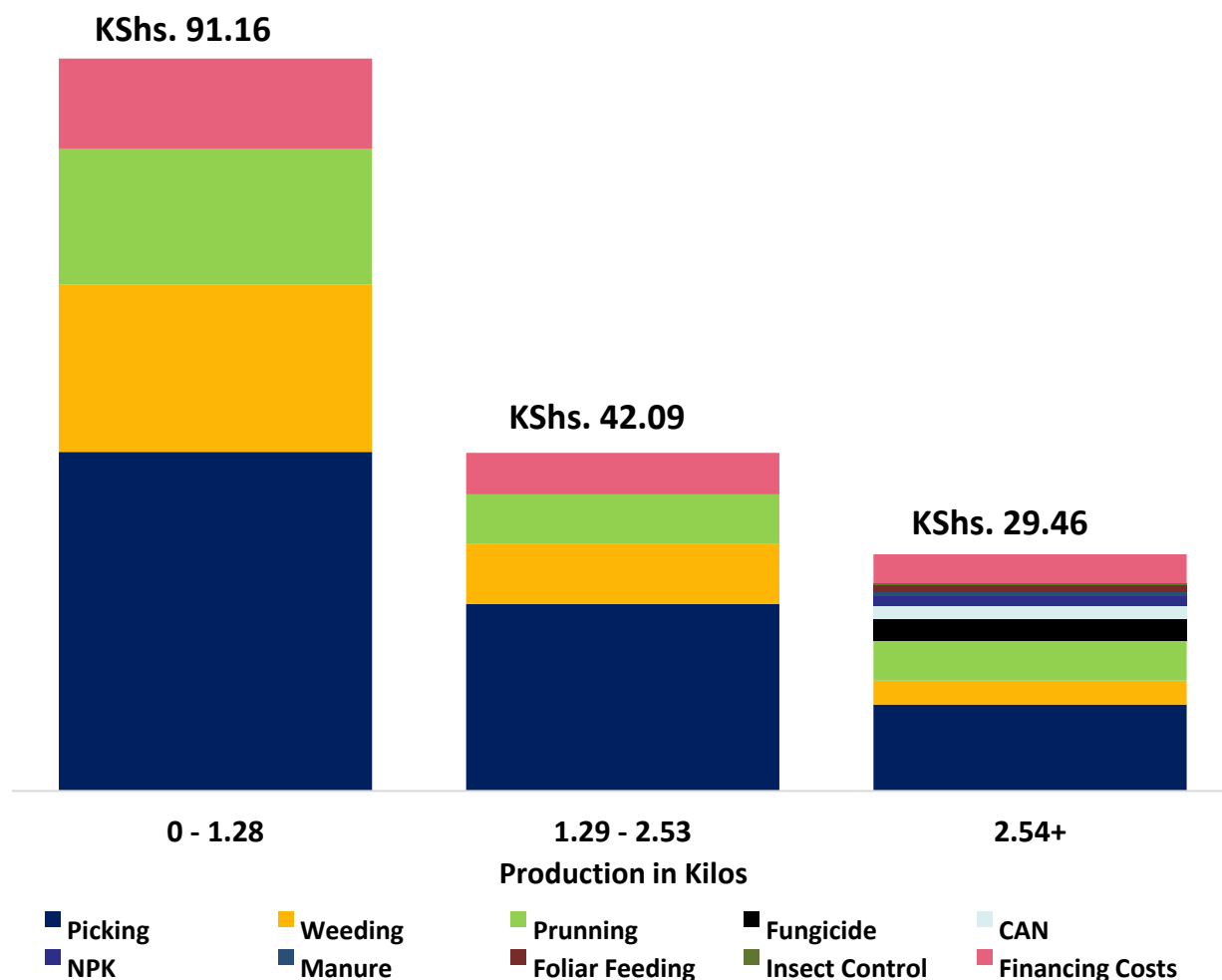
The cost components are on average moving down depending on production level for both estate and smallholder farmers.

In general, the cost of production for both categories will vary based on various factors among them:

- Levels of adoption of Good Agricultural Practices
- Cost of labour
- Cost of input
- Coffee varieties
- Level of productivity (Higher production = lower cost per unit)
- Level of farm management efficiency among others

4.3.7   Revenue Distribution

This study looked at revenue on various fronts as shown:

- ✓ Estate revenue as distributed through the value chain
- ✓ Smallholder revenue as distributed throughout the value chain.
- ✓ Smallholder revenue as distrusted with the cooperative society.

The average ex- auction rate was determined as KShs. 71 per kilo of cherry, which was based on the national average price of USD 4.97 per kilo of clean for year 2016/17. The USD 4.97 was then multiplies with 7 as per the conversion ratio. To explain how this is arrived at, see the following table.

Table 4: Annual Average Price per Kilo of Clean season 2016/17[4]

Green Coffee Weight(Kgs)	No. of bags(50Kg)	Value in USD	Average Price Per 50kg bag	Average Price Per Kg
40,847,837	816,957	202,949,674	248.42	4.97

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[4] Nairobi Coffee Exchange Season 2016/17 Market Report

This amount was distributed throughout the value chain to determine what the different farmer archetypes take home.

Figure 16: Revenue Distribution in Kenya Shillings per Kilo of Cherry
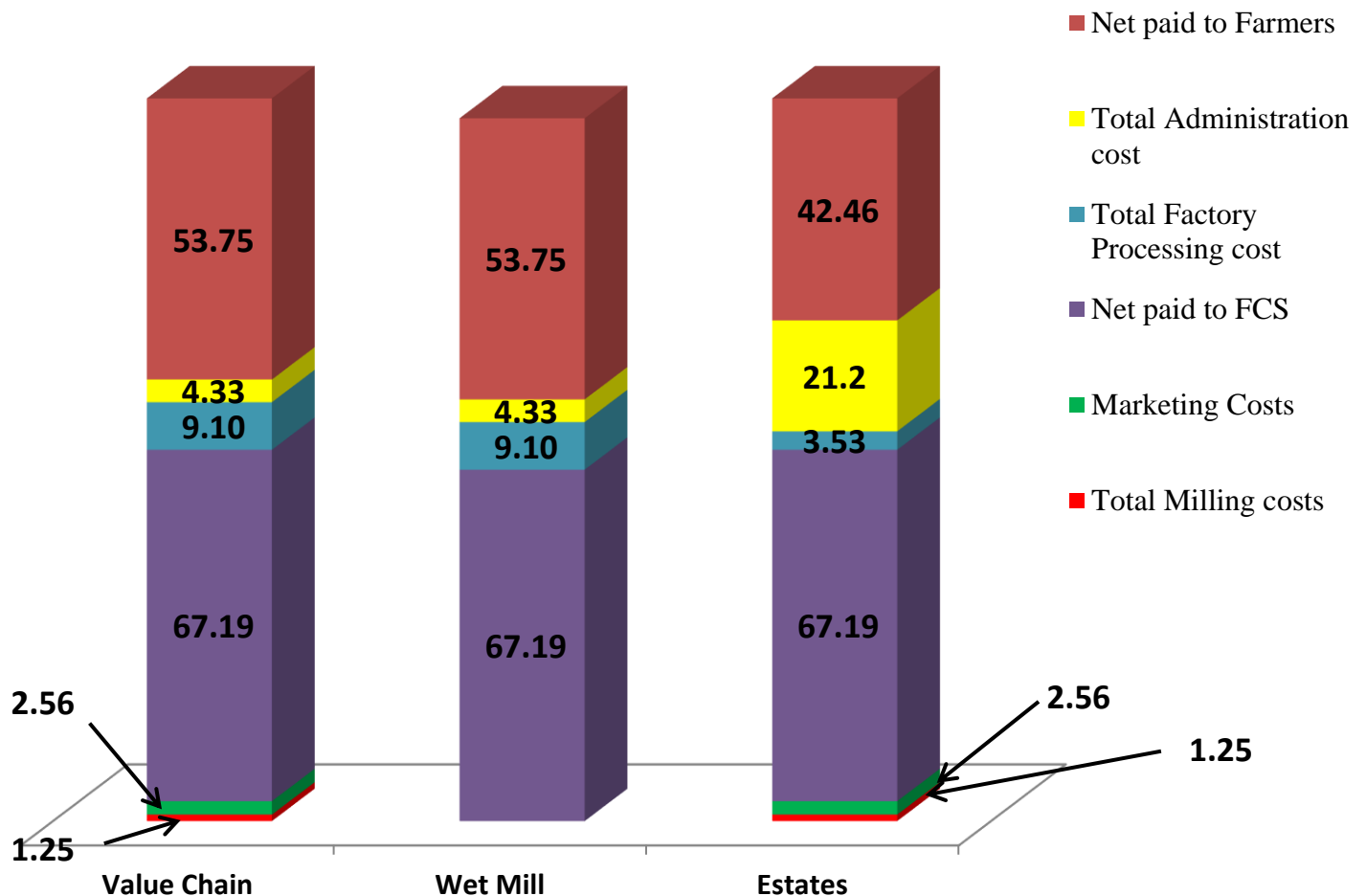
The total revenue of KShs. 71 was distributed throughout the value chain with the farmer being left with KShs. 53.75 after taking care of processing and administrative costs at the society and wet mill level.

As explained in the literature review, all smallholder farmers aggregate their coffee at the wet mill thus the smallholder revenue may be looked at from two perspectives; value chain perspective and the society level perspective as shown in the graph above.

From the value chain perspective, it was observed that the marketing revenue (this included milling component) was only KShs3.86. This left a total of KShs. 67.19 that was transferred to the society level. However, the farmer received KShs. 53.75, with a difference of KShs. 13.43 being retained in the society/wet mill level.

From the society perspective, it was observed that the society received KShs. 67.19 which it shared to administration and factory expenses before distributing the rest (KShs. 53.75) to the farmer. The retained amount KShs. 13.43 was shared between the two functional costs such that administration cost received KShs. 4.33 while factory expenses shared KShs. 9.10.

For estate farmers they still have to pay the marketing and milling costs thus after the amount was distributed throughout the value chain with the estate farmer being left with KShs. 42.46 after taking care of processing and administrative costs that include cost of security and financing. Although the processing costs are much lower for estates, their administration costs seem to offset this gain so they earn less per kilo of cherry compared to the smallholder farmers. However, due their huge volumes, their total income is much higher for the individual farmer.

4.3.8   The Breakeven Points

The Breakeven Point for Estate Farmers

The breakeven per tree for the estate farmer is 3.94 kilo grams. Farmers will make losses while producing anything below 3.94 Kgs of cherry per tree. Above this production, on average, the farmers shall be making profits.

Figure 17: Breakeven Point for Estate Farmers
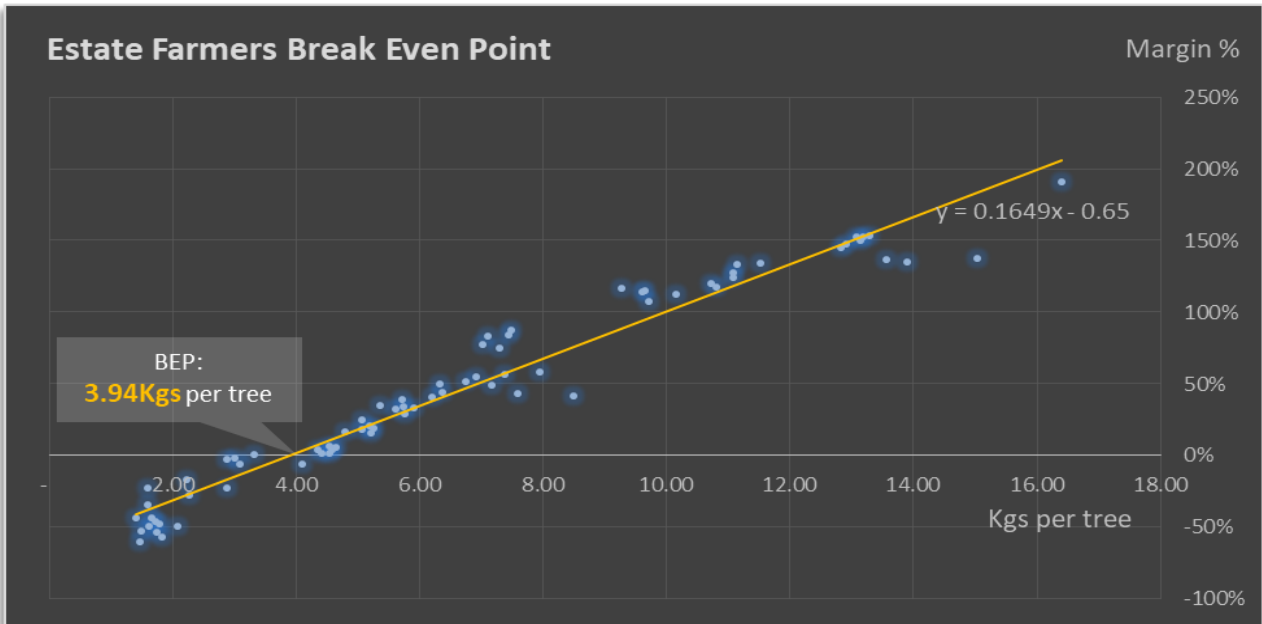
The Breakeven Point for Smallholder Farmers

The Breakeven per tree for the smallholder farmer is 1.28 kilo grams. Farmers will make losses while producing anything below 1.28 Kgs of Cherry per tree. Above this production, on average, the farmers shall be making profits.

Figure 18: Breakeven Point for Smallholder Farmers
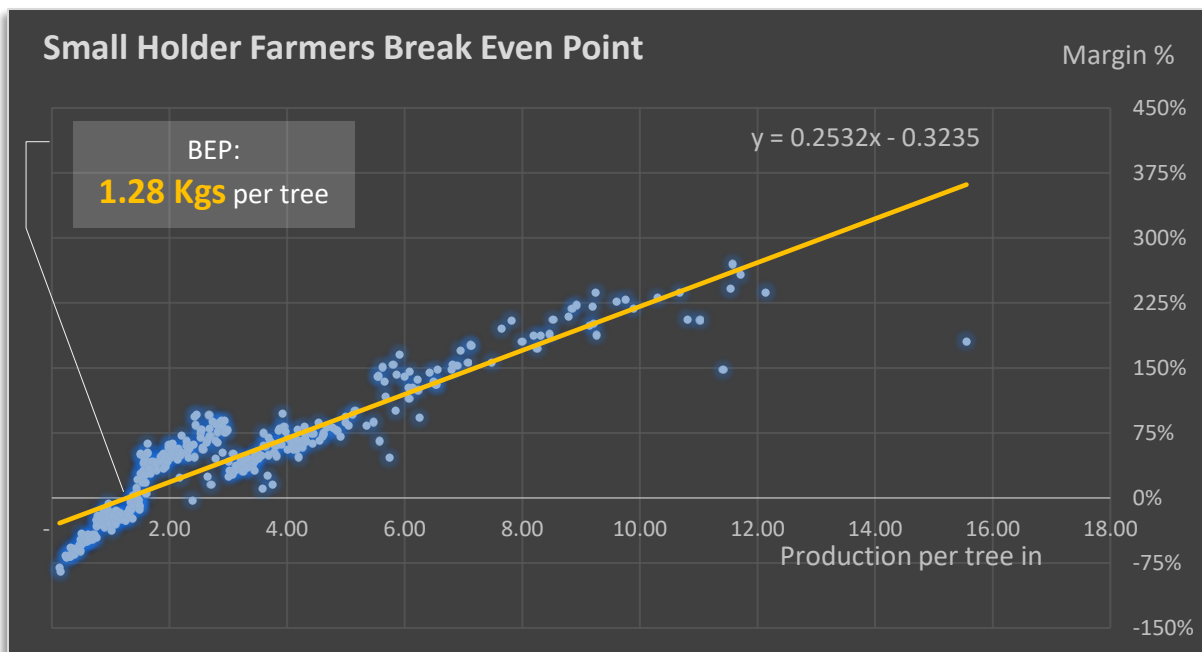
4.3.9 Economic Viability Point

The Economic Viability Point for Estate Farmers

The Economic Viability for the estate farmer is 4.65 kilo grams per tree. The farmers shall not be economically viable while producing anything below 4.65 Kgs of Cherry per tree.

Figure 19: Economic Viability Point for Estate Farmers
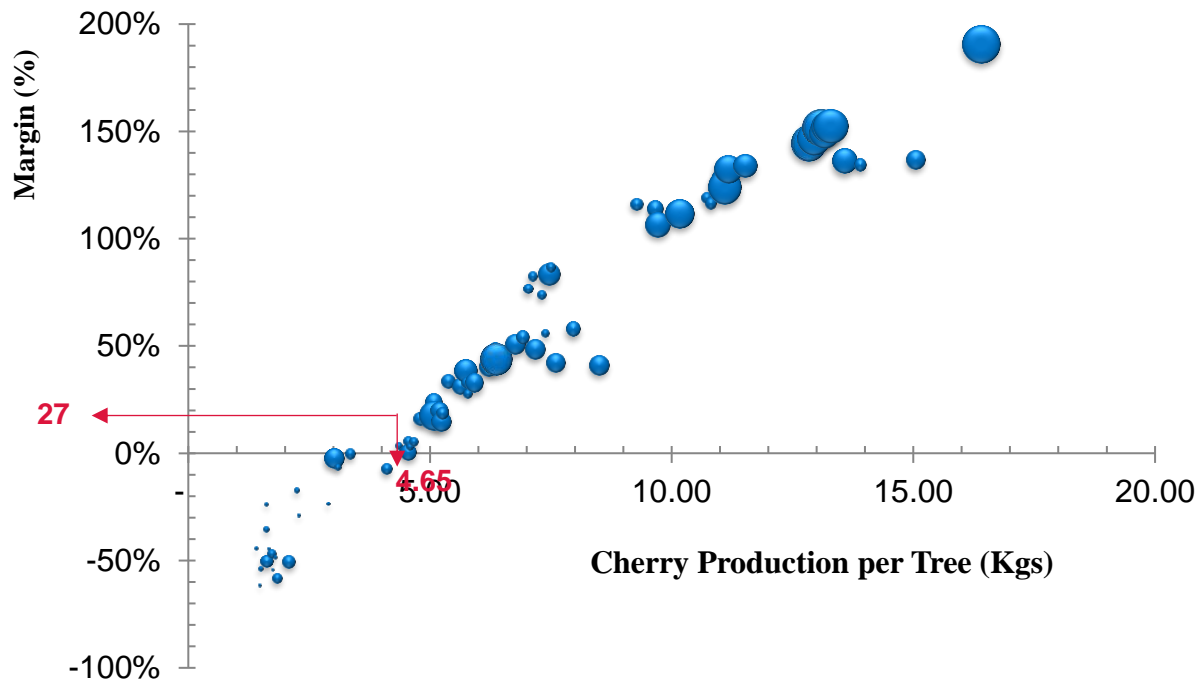
Figure 20: Distribution of Economic Viability for Estate Farmers by production levels

65% are above the economically viable production level
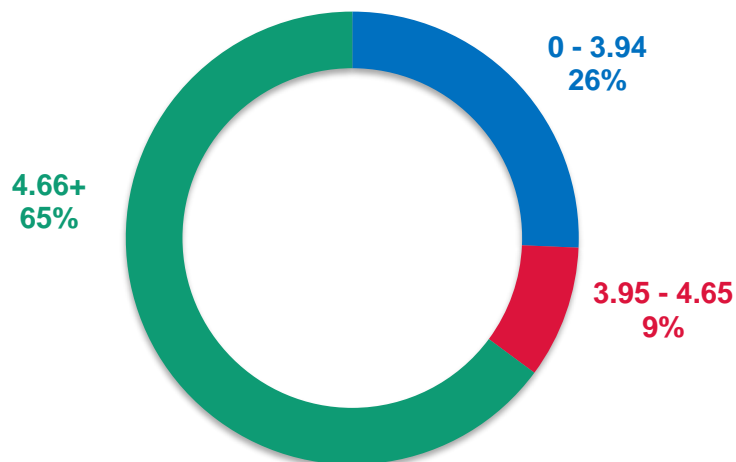
The Economic Viability Point for Smallholder Farmers

The Economic Viability for the smallholder farmer is 2.53 kilo grams per tree. At this production rate, the farmer shall earn living wage, which is our measure of economic viability. The farmers shall not be economically viable while producing anything below 2.53 Kgs of Cherry per tree as they shall not be earning a living wage as calculated by Anker and Anker 2015.

Figure 21: Economic Viability Point for Smallholder Farmers
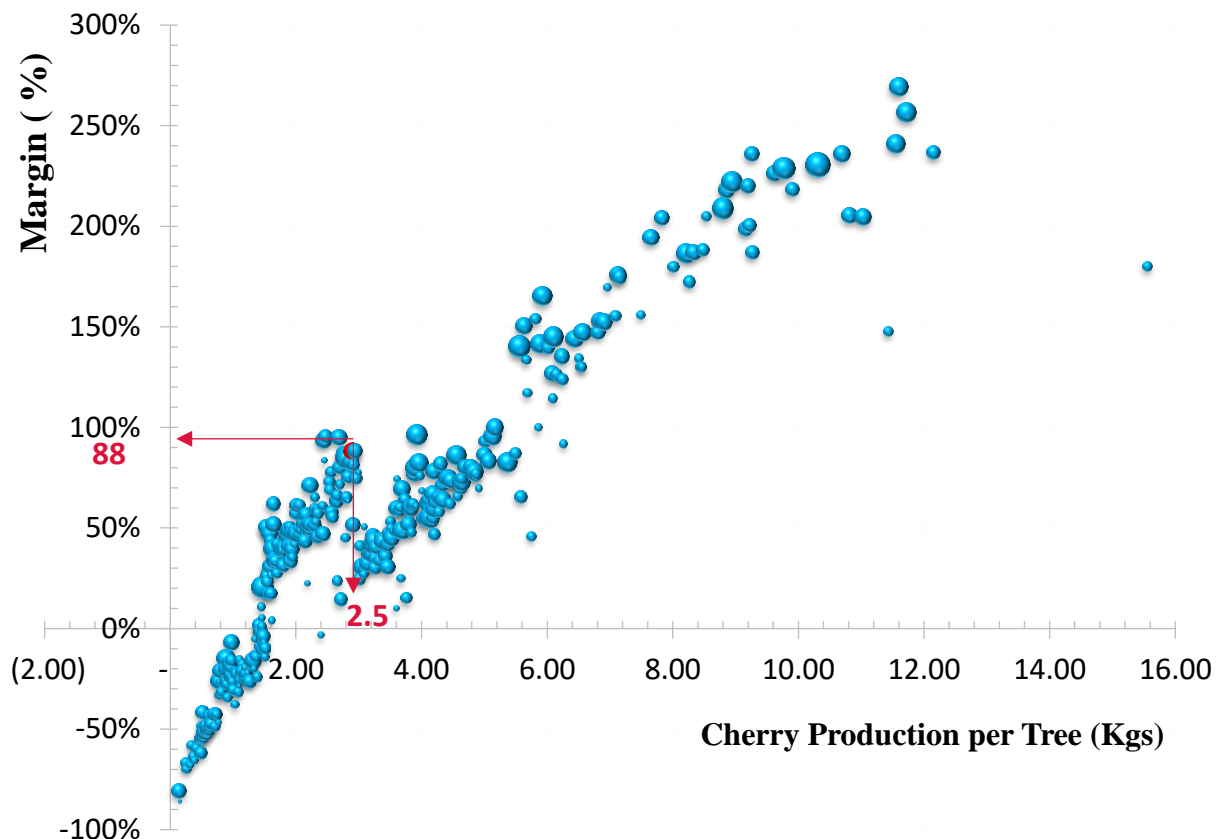
Figure 22: Distribution of Economic Viability for Smallholder Farmers by production levels

Close to 50% are above economically viable production level

0 - 1.28
22%

2.54+
49%

1.29 - 2.53
28%
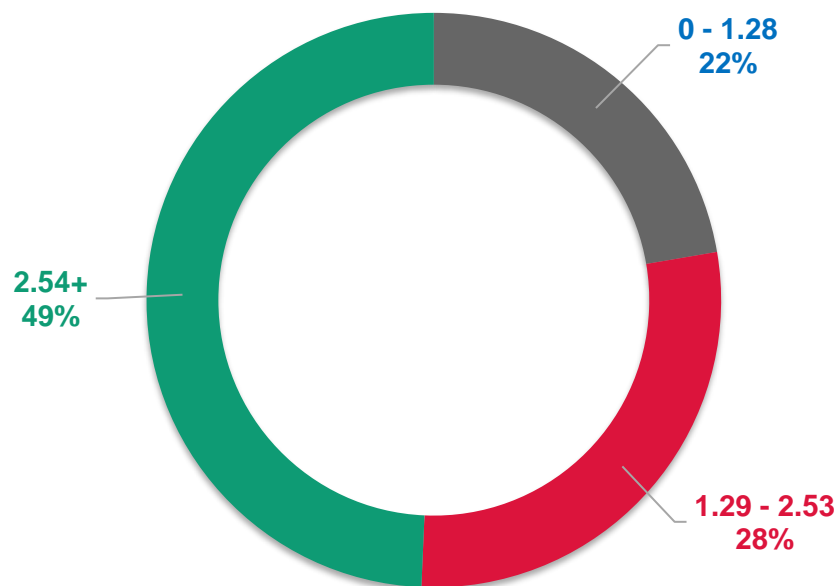
4.3.10 The Wet Mill Perspective

There were a total of 46 wet mills that participated in the study from all the coffee growing regions in the country as shown below:

Figure 23: Number of Wet mills Interviewed per County
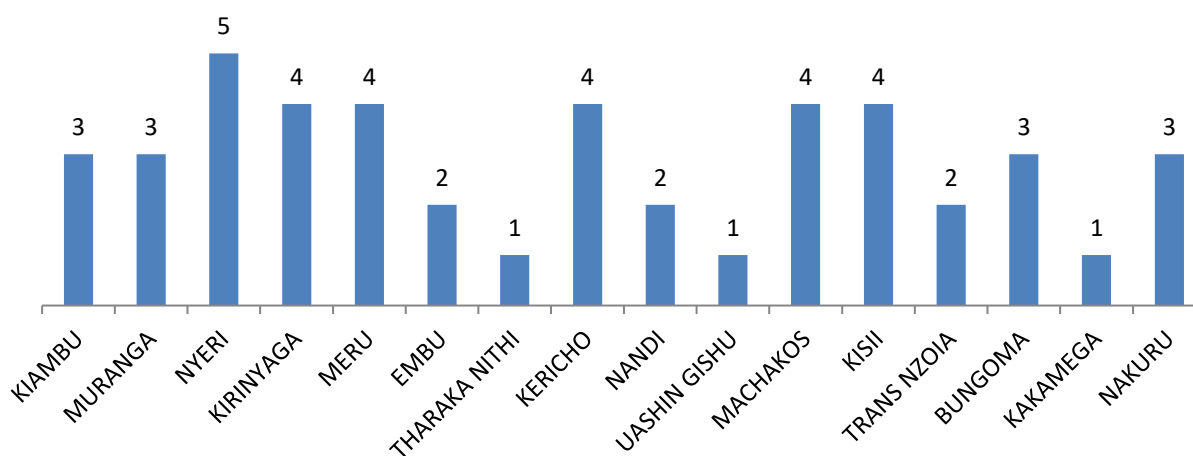
Information was collected and analyzed from the participating wet mills through a questionnaire administered by the field team. The data was then analyzed and used to corroborate data gathered from the smallholder farmers. The wet mill data was also used to identify other factors that affect the handling of the coffee once it leaves the farms and that affect the final payment that the farmer receives.

a) Membership Details

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The average number of members across all wet mills interviewed is 1,179 members. The wet mill with the largest number of farmers had about 2,700 members while the one with the fewest had about 300 members. On average, wet mills in Murang'a County had the largest number of members while the wet mills in Nakuru County had the fewest number of members. The figure below shows the distribution of registered members by county:

Figure 24: Average Registered Members by County

Average Registered Members by County)

County	Average Registered Members
Uasin Gishu	510
Nandi	444
Kakamega	550
Tharaka Nithi	825
Trans Nzoia	610
Nakuru	303
Embu	877
Bungoma	1,575
Kisii	956
Machakos	944
Meru	1,357
Kericho	1,530
Muranga	2,261
Nyeri	1,318
Kirinyaga	1,357
Kiambu	1,583
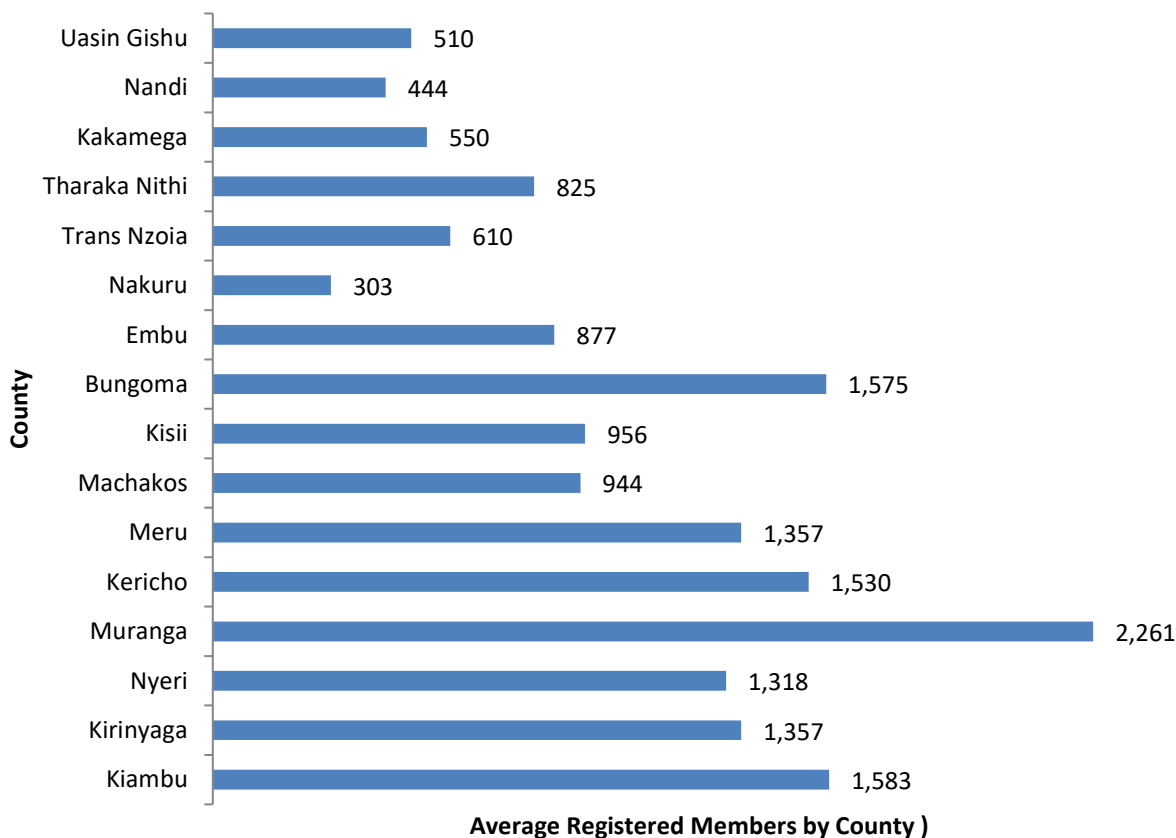
b) Active Members

Further analysis of the membership revealed that there is a high number of members who are inactive across all the participating wet mills. About 25% of members registered are inactive meaning they have not delivered coffee to the wet mills in the last 3 years. This could explain why the number of coffee smallholder farmers is high yet the coffee volume is declining. This also informs a need for further study to dig deeper into the reasons this high percentage is inactive.

Some counties had the active number of members averaging more than 90% of the registered members being active in Kisii/Nyamira, Nandi, Kericho and Kakamega while Kiambu County had the lowest number of active members out of all registered members at 58%. The following is a figure showing the distribution of active members by county.

Figure 25: Active Member VS Registered Members by County
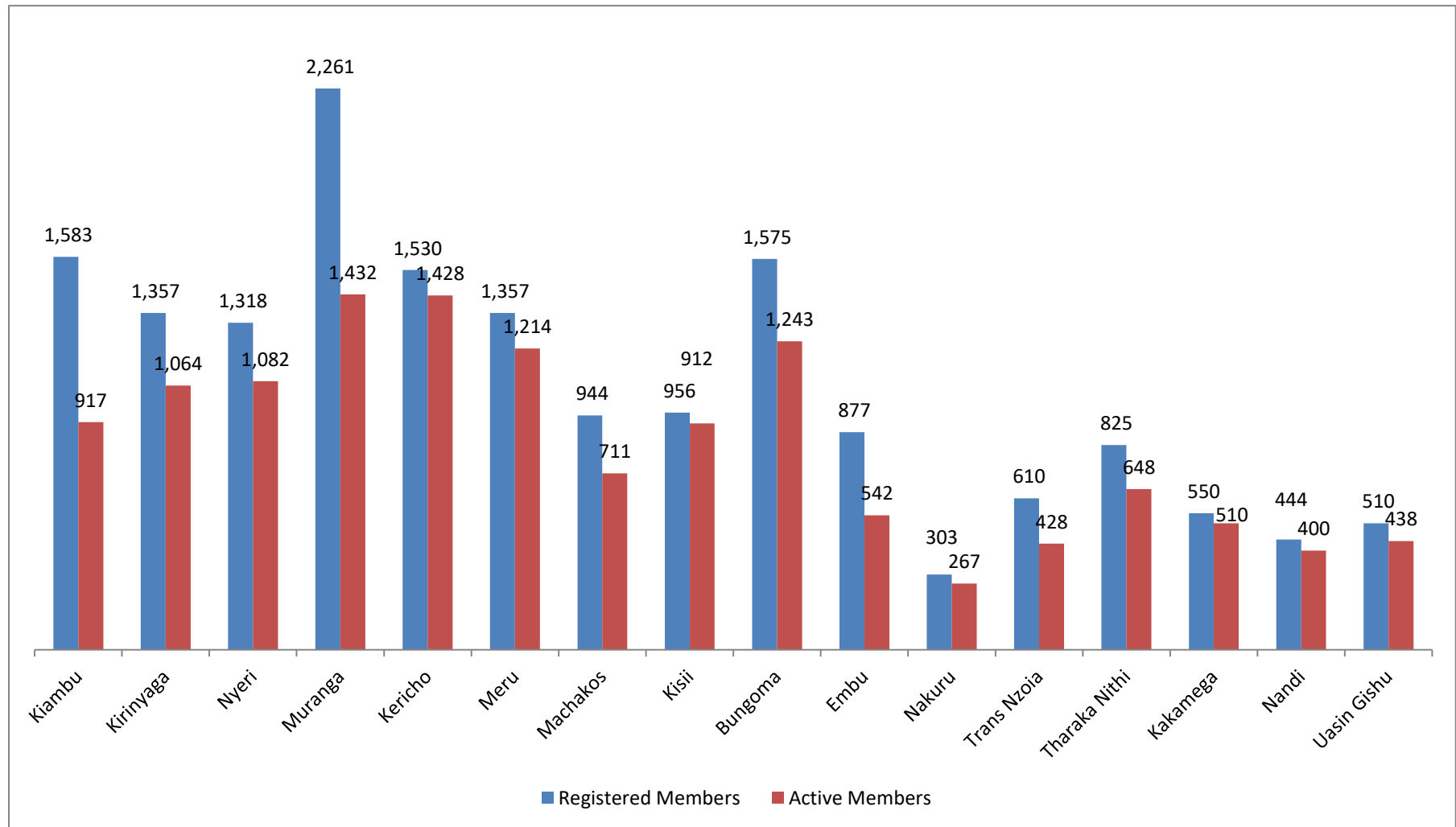
c) **Gender**

The membership data shows an average of 70% of members are men and 30% are women. According to the membership details from the wet mills the gender gap seemed to close compared to the data collected from the smallholder farmers which indicated 83% of the farmers are men and only 17% are women which could be an indication that there has been a significant effort on the membership registration end to include women. This could also be an indication of gains on policy as the constitution (2010) which has the 1/3 gender rule.

Figure 26: Gender of Wet mill Members
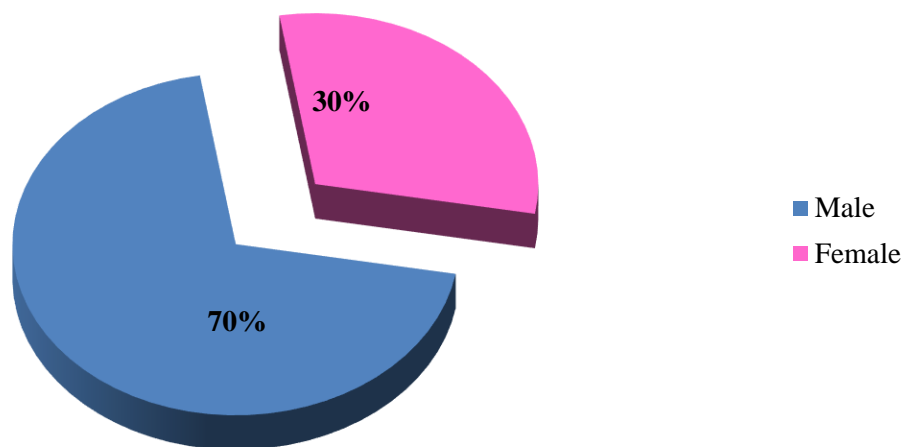
d) Revenue Retention

Wet mills aggregate farmers' coffee for wet milling and drying after which the coffee is taken to millers for dry milling and grading. The coffee is then sold through the auction or direct channels as provided for by the law. Once the coffee is sold the marketing agent remits proceeds within 14 days. The cooperative then work out what each wet mill has been paid and how much each of the members should receive after deducting any debts and other obligations that the wet mill has. They also retain up to 20% as stipulated by law towards the wet mill operations. From the data collected the average revenue retention rate across all participating wet mills is 18% with the wet mill

retaining the least being 5% and one retaining the most being at 39%. The distribution of the retention percentages across the respondent is as shown below:

Most wet mills retain 18% as shown in the normal distribution curve below:

Figure 27: Distribution of Revenue Retention Rate
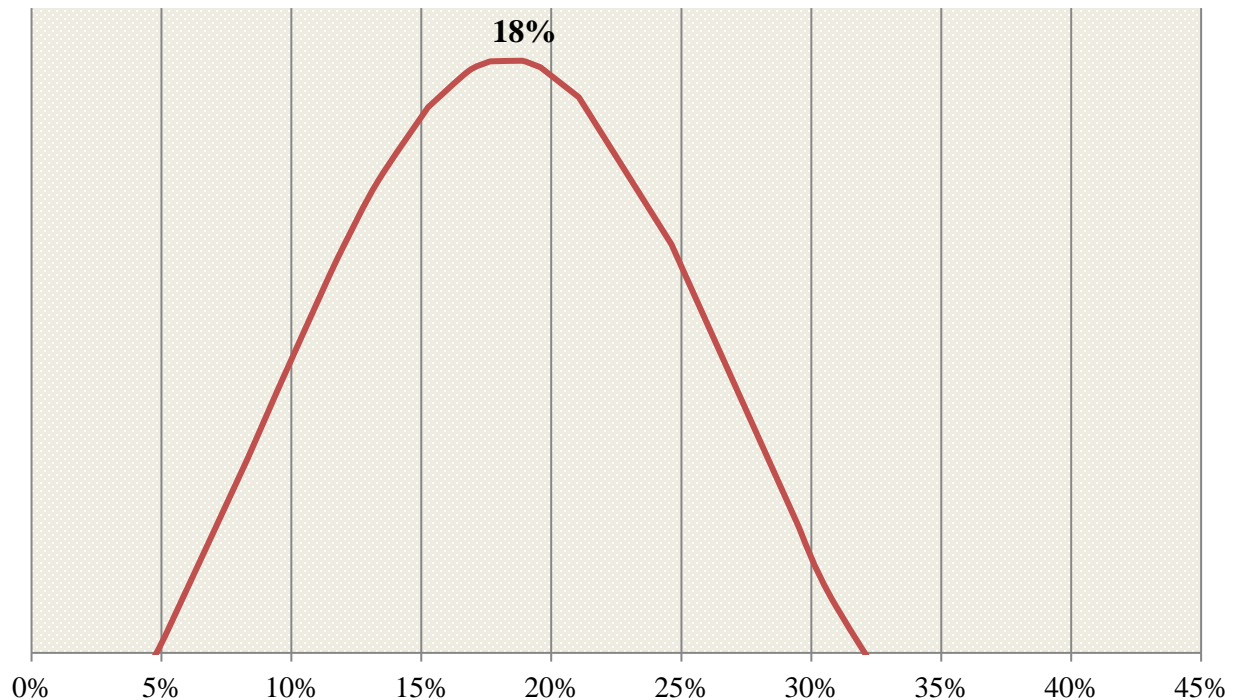
About 72% of the wet mills remained within the stipulated 20% retention by the ministry. Only 13 wet mills retained more than 20%. Impressively 12 out of the 46 wet mills were retaining less than 10% for their operations. This could be an indicator of high levels of efficient, good production and good governance.

e) Revenue Pay-out

Most farmers (72%) from the wet mills interviewed received more than 20% of the revenue realized according to the wet mill data collected. However, about 28% of the wet mills paid out less than the 20% stipulated by the Ministry. With the lowest wet mill paying out at 61% as shown in the graph below:

Figure 28: Pay-out Rate across Wet Mills
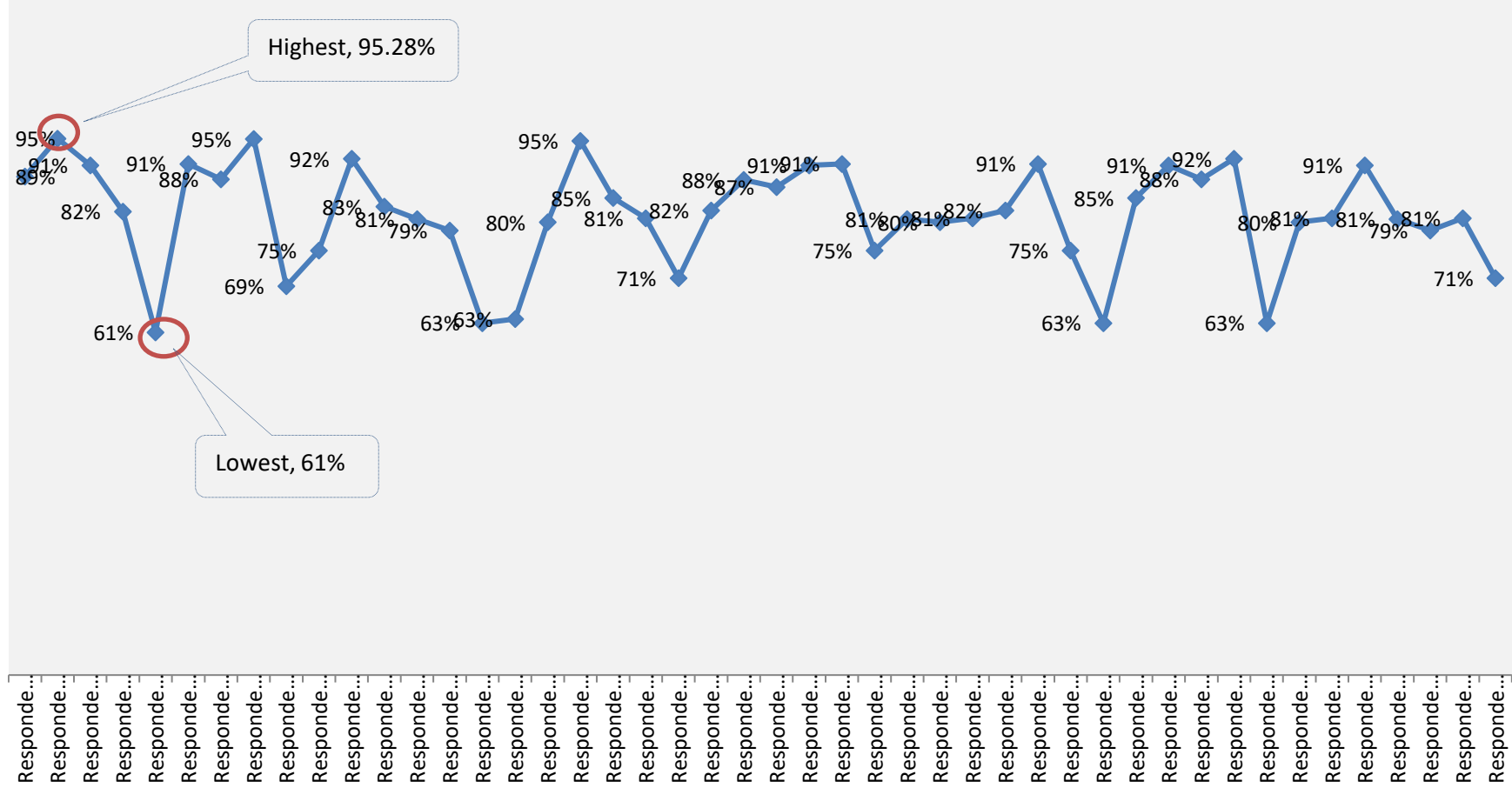
4.3.11 Sensitivity Analysis

i)   **Understanding Factors affecting Pay Out**

The pay-out rate is determined by various factors including volume, quality, market trends and governance among other factors. To best understand these factors, we took the payment calculation documents and conducted sensitivity analysis with data from the participating wet mills presented in section that follows.

Table 5: Pay Out comparison across Wet Mills

	Wet mill 1	Wet mill 2	Wet mill 3	Wet mill 4	TOTAL
Cherry (Kgs)	458,355	281,722	266,083	117,361	1,123,521
Sales of Clean Coffee (Kgs)	74,268	43,583	41,716	17,399	176,966
Conversion Ratio	*6.17*	*6.46*	*6.38*	*6.75*	*6.35*
Revenue					
Sales of Clean Coffee (KShs.)	50,944,136	30,172,544	27,965,136	11,600,482	120,682,298
Average Price per Kg Cherry	*111.15*	*107.10*	*105.10*	*98.84*	*107.41*
Average Price per Kg Clean	*685.95*	*692.30*	*670.37*	*666.73*	*681.95*
Expenditure					
Marketing Expenditure	2,435,326	1,482,420	1,368,600	587,796	5,874,142
Factory Expenditure	3,676,409	2,600,966	2,395,128	1,556,913	10,229,416
Administration	11,346,611	6,181,967	5,776,105	2,140,576	25,445,259
Total expenditure	**17,458,346**	**10,265,353**	**9,539,833**	**4,285,285**	**41,548,817**
Amount for distribution	**33,485,790**	**19,907,191**	**18,425,303**	**7,315,197**	**79,133,481**
Pay-out (KShs. per Kg Cherry)	**73.06**	**70.66**	**69.25**	**62.33**	**70.43**
Pay-out rate	**65.73%**	**65.98%**	**65.89%**	**63.06%**	**65.57%**
Cost Allocations					
Marketing Expenditure	4.78%	4.91%	4.89%	5.07%	4.87%
Factory Expenditure	7.22%	8.62%	8.56%	13.42%	8.48%
Administration Expenditure	22.27%	20.49%	20.65%	18.45%	21.08%
Sensitivity Analysis:					
Recommended 80%	88.92	85.68	84.08	79.08	85.93
Additional amount to the farmer	*15.86*	*15.02*	*14.83*	*16.74*	*15.50*
Benchmarked to neighbours at 85%	94.47	91.04	89.33	84.02	91.30
Additional amount to farmers	*21.42*	*20.37*	*20.09*	*21.69*	*20.87*

Figure 29: Breakdown of Wet Mill Expenditure
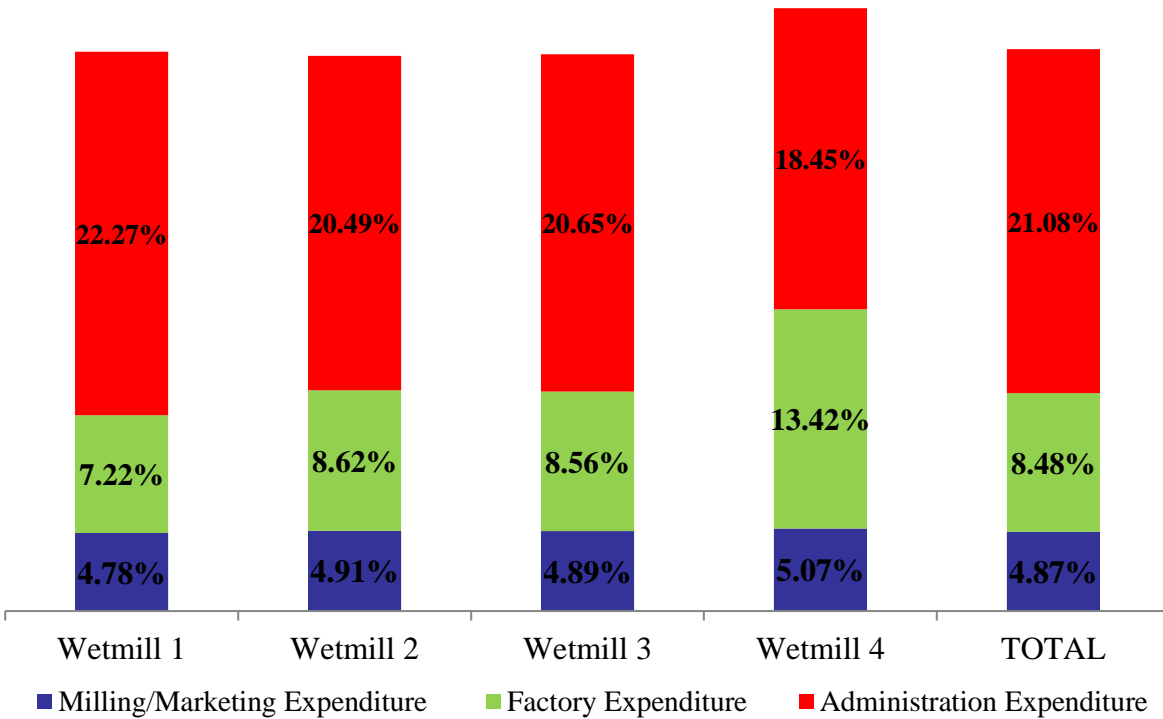
Further an in depth analysis into the various expenditure categories was done which revealed what constitutes these expenditure and the different proportion of these items. We broke down the milling/marketing expenditure which averages 4.87%. Milling costs make about 1.75% of the total milling/marketing Expenditure and is further broken down into milling fees at 1.15% and handling costs at 0.60%. Marketing costs make up 3.12% of the total milling/marketing expenditure and is made up of marketing fees which are set at 2% by the regulators. Other components of the marketing cost include auction commission, export bags and transport to the warehouse. This breakdown is shown in figure 30. A breakdown of the marketing fee of 2% is also provided in the figure 31 which includes warehousing costs, bank guarantee, insurance, ERP, logistics, staff and other administration costs.

Figure 30: Breakdown of Marketing and Milling costs
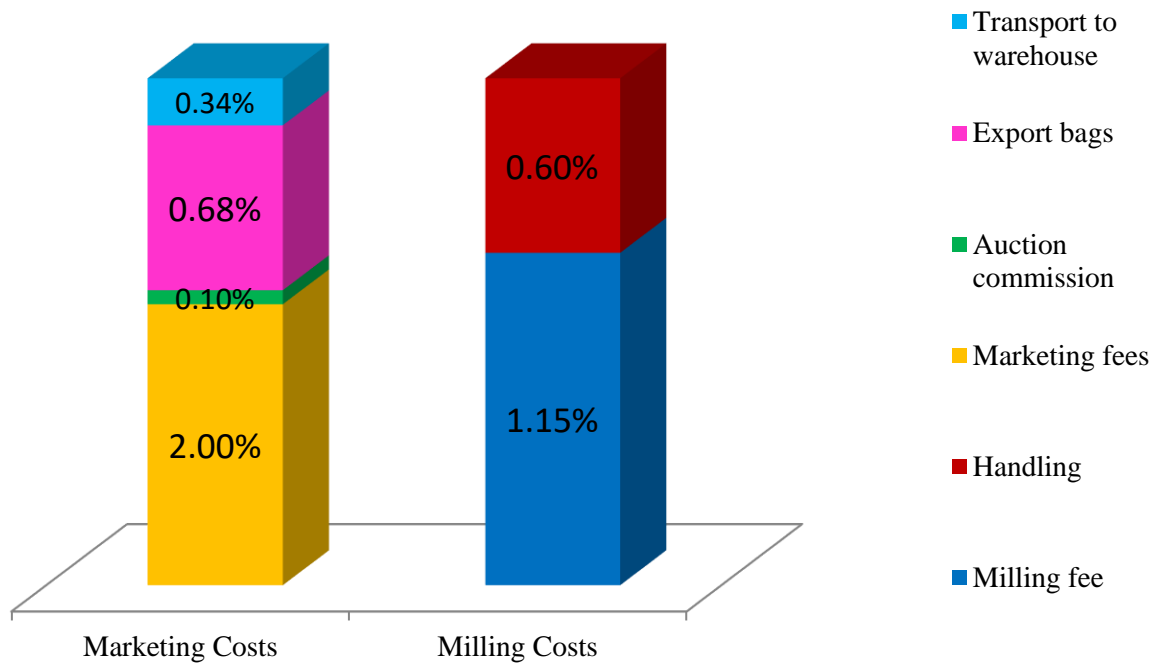
Figure 31: Breakdown of the Marketing Fee (2% of the marketing cost)
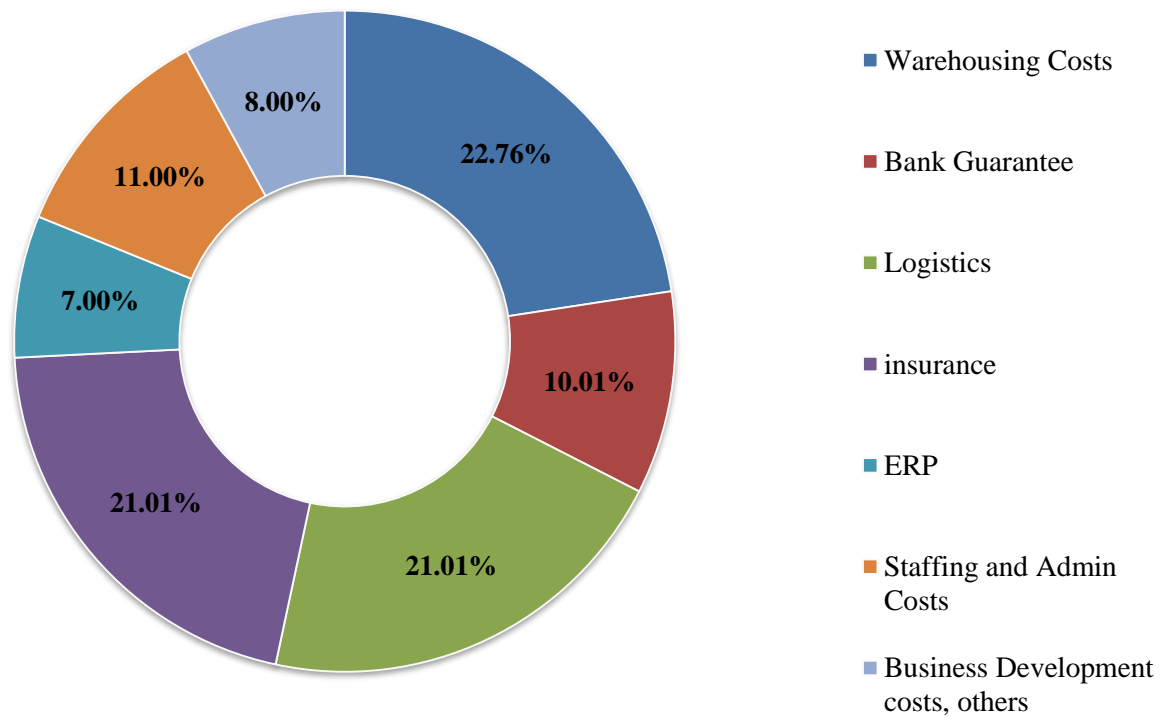
Figure 32: Breakdown of Factory and Administration costs

- Finance costs
- Capex
- Society general votehead

22.27%

- Labour   • Drying materials
- Fuel/ Electricity • Transport and
- Security   bags
- Maintenance   • Water

7.22%

■ Factory Expenditure   ■ Administration Expenditure
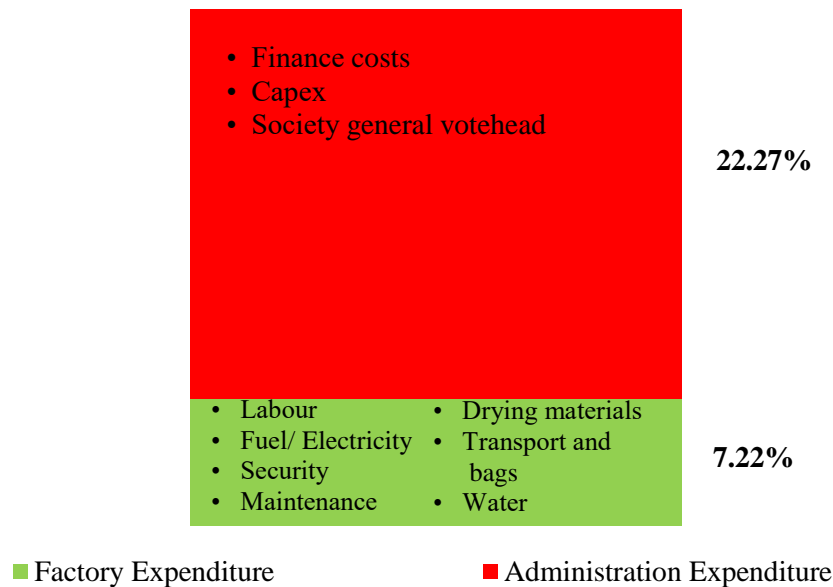
Auction Price

One of the factors that affects revenue and hence pay-out to farmers is market price. The study looked at the auction prices to get some insight. To understand the auction price trends we looked at data from the National Coffee Auction for various sales within season 2016/17and analysed it. We sort to understand the auction price trend and whether this affects the revenue to the wet mills by considering the prices of different grades across a number of sales. Interestingly, the average prices across different grades does not significantly change over time The highest price for AA was about 380 dollars and the lowest was USD 298 over 2 months which is only a variation of USD 70 per 50kg bag. In addition, higher grade consistently fetched higher prices over time compared to lower grades alluding to the fact that regardless of the auction price trend the most important aspect is quality. Grade AA fetched up to USD 380 per 50kg while the highest amount grade C coffee fetched was USD 223 for a 50kg for the period under analysis as shown in the following graph.

Figure 33: Comparison of Average Prices across Different Clean Coffee Grades
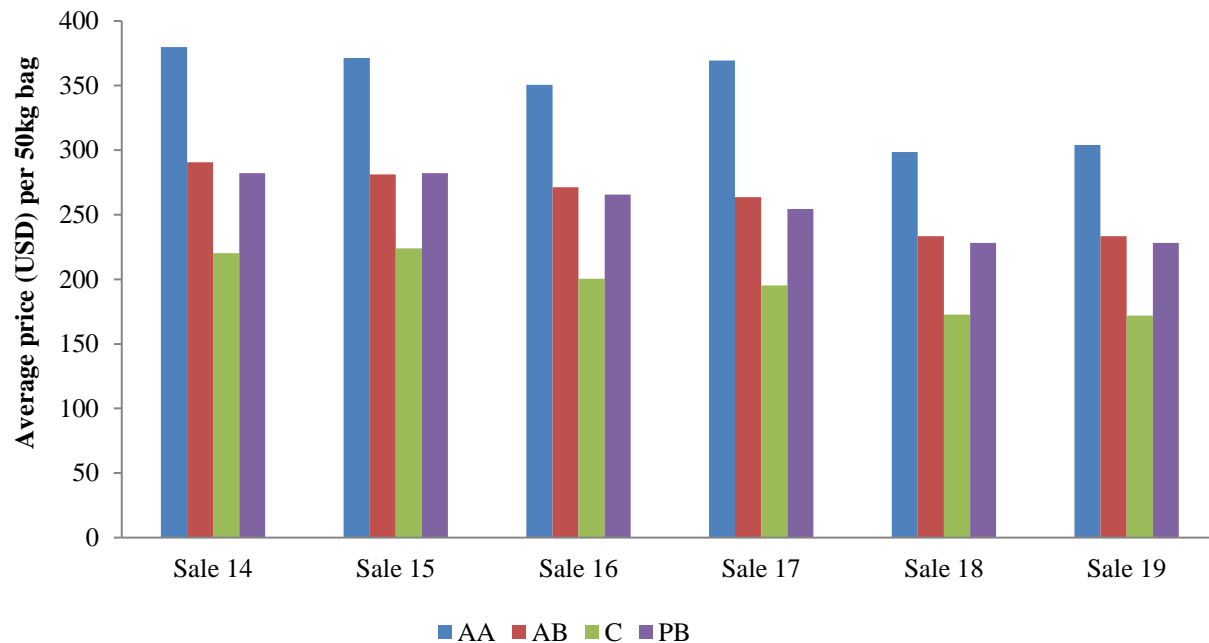
Quality

In order to further understand the importance of quality and its impact on the wet mill revenue, we compared the prices for different classes of coffee for the same grade from one auction. In this case we chose grade AB of different outturns sold within the same auction sale in season 2016/17. We then compared the prices that those outturns, that had different classes (class 3- and class 4+), fetched in this particular auction. The higher quality coffee (class 3-) again consistently fetched higher prices compared to the class 4+ coffee in the same auction. In one particular case we note up to USD 140 difference per 50kg bag between class 3- and class 4+ for AB grade. Quality is therefore a significant determinant of price in the auction and by extension, revenue to the wet mill.

Figure 34: Comparison of price variation for different classes of same grade in same auction

Price Variance of Grade AB, Class 4+ and 3- in Same Auction
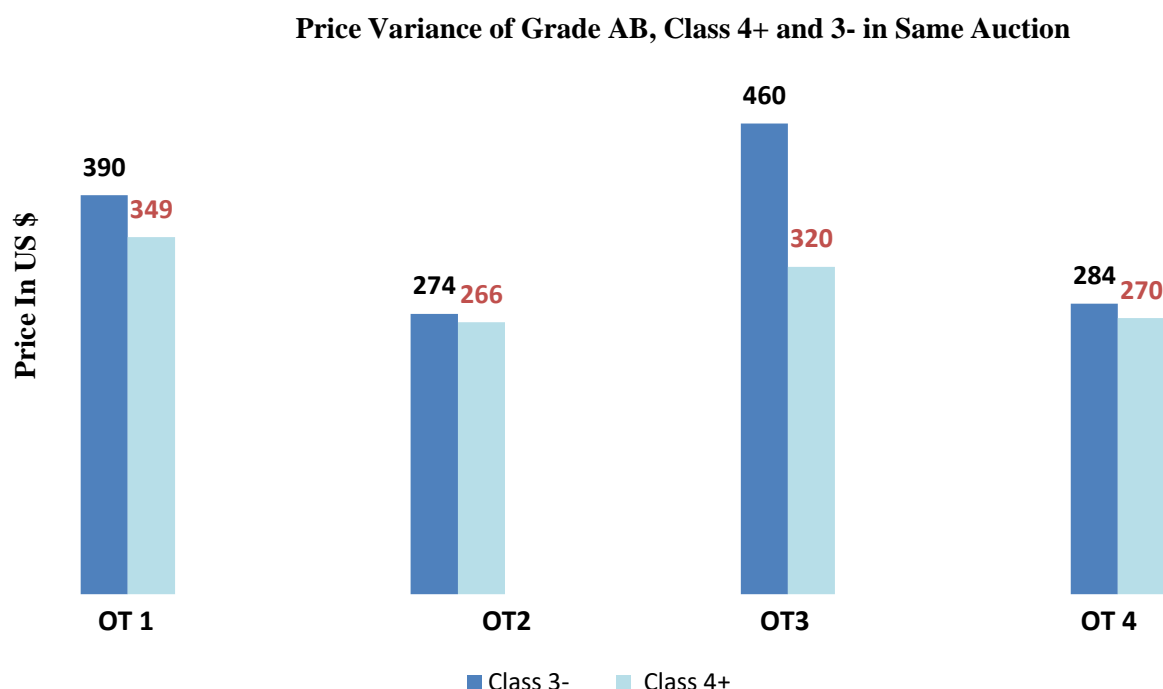
ii) **Sensitivity Analysis of the Revenue Growth Vis a Vis Cost Growth**

Where the revenue grows at a rate of 1%, with the cost also growing at the same rate, the estate farmer is at a constant profitability level. The profit grows by 13% when revenue grows by 10% while holding the costs of production at a zero growth. When the revenue grows at zero percent, the profits shall drop by 11% with a 10% growth in the cost of production. This scenario is the same for both the estate and smallholder farmers.

Figure 35: Estate Farmers sensitivity analysis with revenue and cost growth

	Revenue Growth	0	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
Cost Growth		72.00	72.72	73.44	74.16	74.88	75.60	76.32	77.04	77.76	78.48	79.20
0	56.48	27%	29%	30%	31%	33%	34%	35%	36%	38%	39%	40%
1%	57.04	26%	27%	29%	30%	31%	33%	34%	35%	36%	38%	39%
2%	57.61	25%	26%	27%	29%	30%	31%	32%	34%	35%	36%	37%
3%	58.17	24%	25%	26%	27%	29%	30%	31%	32%	34%	35%	36%
4%	58.74	23%	24%	25%	26%	27%	29%	30%	31%	32%	34%	35%
5%	59.30	21%	23%	24%	25%	26%	27%	29%	30%	31%	32%	34%
6%	59.87	20%	21%	23%	24%	25%	26%	27%	29%	30%	31%	32%
7%	60.43	19%	20%	22%	23%	24%	25%	26%	27%	29%	30%	31%
8%	61.00	18%	19%	20%	22%	23%	24%	25%	26%	27%	29%	30%
9%	61.56	17%	18%	19%	20%	22%	23%	24%	25%	26%	27%	29%
10%	62.13	16%	17%	18%	19%	21%	22%	23%	24%	25%	26%	27%

Figure 36: Smallholder Farmers sensitivity analysis with revenue and cost growth

Revenue Growth		0	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
Cost Growth		53.69	54.23	54.77	55.30	55.84	56.38	56.91	57.45	57.99	58.53	59.06
0	38.73	39%	40%	41%	43%	44%	46%	47%	48%	50%	51%	52%
1%	39.12	37%	39%	40%	41%	43%	44%	45%	47%	48%	50%	51%
2%	39.51	36%	37%	39%	40%	41%	43%	44%	45%	47%	48%	49%
3%	39.89	35%	36%	37%	39%	40%	41%	43%	44%	45%	47%	48%
4%	40.28	33%	35%	36%	37%	39%	40%	41%	43%	44%	45%	47%
5%	40.67	32%	33%	35%	36%	37%	39%	40%	41%	43%	44%	45%
6%	41.06	31%	32%	33%	35%	36%	37%	39%	40%	41%	43%	44%
7%	41.44	30%	31%	32%	33%	35%	36%	37%	39%	40%	41%	43%
8%	41.83	28%	30%	31%	32%	33%	35%	36%	37%	39%	40%	41%
9%	42.22	27%	28%	30%	31%	32%	34%	35%	36%	37%	39%	40%
10%	42.61	26%	27%	29%	30%	31%	32%	34%	35%	36%	37%	39%

iii)   Sensitivity Analysis of the Revenue Growth Vis-a- Vis Cost Drop

Where the revenue grows at a rate of 10%, with the cost dropping at the same rate, the estate farmer is at more than double the profitability level, (56% against 27%). The profit grows by 13% when revenue grows by 10% while holding the costs of production at a zero growth. When the revenue grows at zero percent, the profits shall grow by 15% with a 10% drop in the cost of production.

Figure 37: Estate farmers' Sensitivity Analysis with Revenue Growth and Cost Drop

Revenue Growth		0	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
Cost Drop		72.00	72.72	73.44	74.16	74.88	75.60	76.32	77.04	77.76	78.48	79.20
0	56.48	27%	29%	30%	31%	33%	34%	35%	36%	38%	39%	40%
1%	55.91	29%	30%	31%	33%	34%	35%	36%	38%	39%	40%	42%
2%	55.35	30%	31%	33%	34%	35%	37%	38%	39%	40%	42%	43%
3%	54.78	31%	33%	34%	35%	37%	38%	39%	41%	42%	43%	45%
4%	54.22	33%	34%	35%	37%	38%	39%	41%	42%	43%	45%	46%
5%	53.65	34%	36%	37%	38%	40%	41%	42%	44%	45%	46%	48%
6%	53.09	36%	37%	38%	40%	41%	42%	44%	45%	46%	48%	49%
7%	52.52	37%	38%	40%	41%	43%	44%	45%	47%	48%	49%	51%
8%	51.96	39%	40%	41%	43%	44%	45%	47%	48%	50%	51%	52%
9%	51.40	40%	41%	43%	44%	46%	47%	48%	50%	51%	53%	54%
10%	50.83	42%	43%	44%	46%	47%	49%	50%	52%	53%	54%	56%

Where the revenue grows at a rate of 10%, with the cost dropping at the same rate, the smallholder farmer is close to double the profitability level, (69% - 39%). The profit grows by 13% when revenue grows by 10% while holding the costs of production at a zero growth. When the revenue grows at zero percent, the profits shall grow by 15% with a 10% drop in the cost of production.

Figure 38: Smallholder farmers' Sensitivity Analysis with Revenue Growth and Cost Drop

Revenue Growth		0	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
Cost Drop		53.69	54.23	54.77	55.30	55.84	56.38	56.91	57.45	57.99	58.53	59.06
0	38.73	39%	40%	41%	43%	44%	46%	47%	48%	50%	51%	52%
1%	38.34	40%	41%	43%	44%	46%	47%	48%	50%	51%	53%	54%
2%	37.96	41%	43%	44%	46%	47%	49%	50%	51%	53%	54%	56%
3%	37.57	43%	44%	46%	47%	49%	50%	51%	53%	54%	56%	57%
4%	37.18	44%	46%	47%	49%	50%	52%	53%	55%	56%	57%	59%
5%	36.80	46%	47%	49%	50%	52%	53%	55%	56%	58%	59%	61%
6%	36.41	47%	49%	50%	52%	53%	55%	56%	58%	59%	61%	62%
7%	36.02	49%	51%	52%	54%	55%	57%	58%	59%	61%	62%	64%
8%	35.63	51%	52%	54%	55%	57%	58%	60%	61%	63%	64%	66%
9%	35.25	52%	54%	55%	57%	58%	60%	61%	63%	65%	66%	68%
10%	34.86	54%	56%	57%	59%	60%	62%	63%	65%	66%	68%	69%

The take home points in this case are that the movement and/or co movement of both revenues and costs are very key drivers to the economic viability of the coffee growing in Kenya. Efforts need therefore to be made to enhance revenue generation while controlling the costs of production.

5.0   RECOMMENDATIONS

During the study a few challenges facing Kenya coffee sector were noted and some ideas on how to address these are listed below:

Improved Recording Keeping: Farmers especially smallholders were not maintaining proper and adequate records. This gave an indication that they are yet to take coffee farming as a business. As a result they are not able to tell if they are profitable or not. This was also a challenge to the research team that had to get data from the wet mill for the farmers that did not have data.

Farmers need to be trained on proper record keeping. This will help them in decision making and evaluation of the performance of the different projects that they might be having.

Better Adoption of Good Agricultural Practices (GAPs): The Kenyan government has put considerable efforts to offer agricultural extension services to farmers but there has been very poor adoption. Most of the respondents confirmed to have been trained although they were not implementing what they had learnt. However, it was also noted that cost of offering extension are quite high and partners offering these should be encouraged to use cost efficient models such as Trainer of Trainers(TOT) model also known as (Farmer to Farmer trainers) model for the sustainability reasons. Most of the existing programs hire agronomists to train farmers one on one during their implementation. This model is very expensive and farmers are left on their own once the program ends. Also, tools such as demo plots need to be used more frequently to make training more practical. More Private Public Partnerships (PPP) should be encouraged for sustainability as more value chain players are involved.

More Lending to Agricultural Sector is needed: Due to high risks associated with farming and lack of insurance in the country to cover the agricultural risks, financial institutions are reluctant in extending credit to farmers. Farmers are required to provide collateral for them to access credit, which they do not have. This result in lack of capital thus farmers are not able to invest to a level of optimal production which affects viability.

Climate Change Mitigation and Adaption: Global warming associated with GHG emissions have interfered with the normal weather pattern and made coffee farming more complicated as tree flowering is not uniform and even. Over the recent years, farmers have experienced low flowering due to prolonged drought. This has in turn resulted to low production, very high cost of production and poor quality. Farmers should be educated on climate change mitigation and adaptation techniques in coffee farming to remain resilient.

Youth Inclusion: Most of the farmers are aged as the study noted; the average age of a coffee farmer is 54 years. This means that in most farms the farmers' energy is diminishing and they are not fast to learn new ideas and technology. The study noted that only 5% of the respondents were below 35 years. Youth inclusion in the coffee farming should be given a priority.

Women Inclusion: Women exclusion in coffee farming has posed a big gap between the existing training and implementation. This is due to the fact that most of the trainings are attended by men while women tender the coffee bushes. The study noted that only 17% of the respondents were women indicating that although most of the women do the work on the farm they are not engaged in any coffee farming decision making. Training modules and programs that focus on women should be developed and implemented. The coffee farming communities should embrace the household approach in managing the coffee farms.

High Quality Agro - inputs: Most of the respondents especially the smallholders cited this as one of the biggest challenges. The Kenyan market is flooded with counterfeits of all products including agro-inputs. This has resulted in loss of crops and high cost of inputs lowering the profits and eventually affecting the viability of coffee farming. Bulk procurement by the farmers groups should be encouraged since most of the counterfeits products are found in the local agro-vet shops that are not approved. The policy makers need to ensure that proper checks are done frequently to flash out counterfeits from the market.

Cushioning on Volatile Prices: The coffee prices are heavily affected by the New York prices. Since Kenya only produces about 0.5% of the world coffee, this mean it cannot significantly influence the world market and is a coffee price taker. The lack of cushioning of the farmers against the volatile prices demotivates them resulting in low production. Eventually this has led to high cost of production and low profits putting the coffee economic viability at risk. A

mechanism should be established to cushion the farmers from this price volatility to stabilize revenue.

Farmer Organization Capacity Building: The study noted that most of the smallholders complained about their farmer support organizations in terms of inefficiency or poor management of funds. Capacity building in terms of governance should be given a priority. Further, there should be adequate supervision by the regulatory bodies.

6.0   REFERENCES

Montagnon, C., (2017). Coffee Production Costs and Farm Profitability: Strategic Literature Review Specialty Coffee Association Dr Christophe, RD2 Vision October 2017

Agri-Logic and Valued Chain, (2017). AFRICAN COFFEE SECTOR INVESTMENT OPPORTUNITIES Summary of sector reviews of Angola, Burundi, Cameroon, Côte d'Ivoire, Ethiopia, Kenya, Rwanda, Tanzania and Uganda.

GCP (2017), Economic Viability of Coffee Farming, Kenya.

Haggar J. 2008. Manejando los costos de produccion de café en fincas organicas y convencionales. Ramacafé, Nicaragua 2008.

Haggar, J., Jerez, R., Cuadra, L., Alvarado, U., & Soto, G. (2012). Environmental and economic costs and benefits from sustainable certification of coffee in Nicaragua. Food Chain, 2(1), 24-41.

ICO, 2016. Assessing the economic sustainability of coffee growing. Doc ICC, 117-6, 23 pp.

Stewart, P., 2014. The Business Case for the African Coffee Farmer. Can Smallholder Farmers Become Coffee Farmer Entrepreneurs? AFCA Conference, 2014.

Technoserve, 2014. Colombia: A business case for sustainable production. Sustainable Coffee Program, IDH.

Lundy, M. 2015. Production Costs: Evidence from Colombia. SCAA 2015 Lectures.

7.0   APPENDICES

APPENDIX 1: ASSUMPTIONS

- ➢ Conversion of cherry to clean (green) is 7:1
- ➢ The average smallholder farmers has 250 coffee trees on about 1/2 acre
- ➢ Exchange rate is KShs.100 to 1 USD
- ➢ Milling loss is an average of 27% across different parchment types
- ➢ Regulatory framework is stable and predictable
- ➢ No drastic climatic changes
- ➢ Cost of finance assumed to be 14% per annum
- ➢ One year treasury bill rate is 11.16% for October 2016(start of coffee year 2016/17)
- ➢ Annualized inflation rate of 5% per annum
- ➢ Income tax at 30%
- ➢ A debe carries 15 Kgs of cherry

APPENDIX 2: RESEARCH QUESTIONNAIRES

a) <u>SMALL HOLDER FARMER QUESTIONNAIRE</u>

1. GENERAL INFORMATION

Date of Study (DD/MM/YYYY)	/ /		
Enumerator's Name			
Respondent's Name		Gender (a):	
Cooperative Society			
Factory Name			
County Name			

2. REGISTERED MEMBERS DETAILS

	Age (years) Blocks d	Highest Level of Education (code a)	Primary activity (code b)	Home occupancy (code c)	
Information on					
Household size:	No. adult male	No. adult female	No. children (< 18 Yrs.)		
			Male		Female	
a) Highest level of education	**b) Primary activity/activities**				
1 =No formal education 2= Primary school 3= High/secondary school 4= College 5= University 6= Other (specify):	0 = Coffee farming 1 = Other cash crop farming 2 = Food crops 3 = Dairy farming 4 = Other livestock farming e.g. goat, poultry 5 = Business[trade/services (non-agric.)] 6 = Formal salaried employee (e.g. civil servant, private sector, domestic work) 7 = Retired 8 = Other (specify):_____				
c) Home occupancy	**d) Age (years)**				
1= permanently resident 2= sometimes away (< 3 months/year away) 3= frequently away (3 – 9 months/year away)	1.= 18-25 Years 2.= 25-35 years 3.= 35-45 years 4.= 45 -55Years				

	5.= Above 55 years

3. ASSETS – LAND AND LIVESTOCK
a) Land

Number of Parcels	Size of parcel*(code)*	Tenure system *(Code)*	If parcel is *owned,* who owns *(Code)*
1			
2			
3			
4			
Total farm:			

Size of parcel	Tenure System	If Owned, Name on title/certificate:
1= acre 2= ha 3= other, specify: *[conversion in metric system]*	1= Title deed 2= Owned but not titled 3= Community land 4= Lease 5=Other (specify)	1= Male household 2= Female household 3= Joint household

4. GOOD AGRICULTURAL PRACTICES(GAP)

a) How long have you been in coffee farming? _____ (years)

b) Complete the table below, for the variety/type and number of coffee trees on the farm:

Coffee Varieties	System* under which it is grown **(code)**	Current number of trees	Area in Acres
SL 34			
SL 28			
K7			
Ruiru 11			
Batian			
* System			

Note: *System: Pure stand=1; Intercropped=2; Shaded=3; Un-shaded=4 (enter ALL those that apply).

c) What is the average yearly cherry production on your farm? _____ (kg) and how much was the price per kilo?

Year	Kgs	Price per Kg
2012		
2013		

2014		
2015		
2016		

d) Which of the GAPs do you practice on your farm? (Tick)

    i.   *Use of improved seed* ☐
    ii.   *Inorganic fertilizer use* ☐
    iii.   *Organic fertilizer use* ☐
    iv.   *Soil conservation* ☐
    v.   *Pest and disease control* ☐
    vi.   *Harvesting operations* ☐
    vii.   *Post-harvest practice/care* ☐
    viii.   *Soil testing* ☐
    ix.   *Coffee tree nursery management* ☐

e) Have you received any form of training on Good Agricultural Practices on the farm?

    a) Yes   ☐ *(***ASK f-h below**)
    b) No   ☐ **(SKIP TO 5)**

f) If Yes at (2) from whom did you receive the training?

    a) SMS (Mobile Text)
    b) Cooperative society
    c) Others (specify)_____

g) If Yes to the answer above, specify on areas where you have received training.

    _____
    _____
    _____

h) How would you gauge your level of training on Good Agricultural Practices?

    i.   Excellent
    ii.   Very good
    iii.   Average
    iv.   Poor

5. COST OF COFFEE PRODUCTION

a) How much did you spend in the last year on coffee farming activities?

Field Activity	No of times per year	Cost (KSHS)
Labour costs (See 5b.)		
✓ **Hand Weed control**		
✓ **irrigation application**		
✓ **Herbicide application**		
✓ **Irrigation application**		
✓ **Conservation(terracing, shade trees, mulching)**		

E

✓ **Fungicide Application**		
✓ **Fertilizer application**		
✓ **Pruning**		
✓ **Manure application**		
Chemical costs		
Soil Improvement – Ground Fertilizer		
• **CAN**		
• **NPK**		
• **Manure**		
Foliar Feeding		
• **Monar|Tomek|Wuxal Boron|Nutrivant|,Urea, e.Salt| etc.**		
Disease Control		
• **Cabrio | Nordox |Delan|Nativo|Michrothiol**		
Fungicide Control		
• **Copper|Cabrio|Delan|Daconil| Quandris| Nativo|,Captan etc.**		
Pests Control		
• **Dursban|DC Tron|Diazinon|Dursban**		
Soil Amelioration		
• **Lime, Rock phosphate, Gypsum**		
Insects Control		
• **Actara, Bouviteck, Decis, Fursban, Microthiol etc.**		
Others (Please specify)		

b) Source of Labour?   1. ☐   2. ☐   3. ☐

1= **Family labour 2. = Hired labour 3. = Mixed (1&2)**

*If family labour ask for time and **1***calculate wage equivalent*

c) Other Crop costs:

	Cost per unit	No of units	Total Cost
Picking in debes			
Transport bags			
Cherry transport to the factory in debes			

F

d) Complete the table below for the other Food/cash crops sales

Food/ Cash crop	Area allocated (Acres)	Intercropped with coffee (Yes/No)
1.		
2.		
3.		
4.		

e) Complete the table below for the other cash crops sales:

Where do you sell other Food/cash crops	Do you sell / aggregate the crops to this 'location'? (0 = No, 1 = Yes)	Distance to selling point (km)	Mode of transportation * (code)	kg harvested and sold	Price received per kg Price received per bag
Neighbours					
Middlemen/ Brokers					
Export					
Processing plant					
Cooperatives					
Other, specify: ---------------- ---------------- ---------------- ----------------					
*Mode of transportation	1 = by foot, 2 = motorbike, 3 = ox cart 4 = handcart, 5 = car, 6 = truck, 7 = other, specify:_____ ___				

6. FAMILY FOOD CROPS PRODUCTION

a) Which food crops do you grow and approximate area allocate for each crop, quantity produced and consumed at home?

Food crop	Area allocated (Acres)	Quantity produced	Quantity consumed

b) Other income generating Activities

----

7. GROUP MEMBERSHIP, ACCESS TO CREDIT, TRAINING AND COFFEE INFORMATION SERVICES

a) Are you a member of any farming related self- help group or co-operative society? ____
   (0 = No, 1 = Yes)

b) If yes, what year did you join? Group _____; Co-operative society: _____

c) What services do you get? from the:
   i) Group: _____

   _____

   ii) Co-operative society: _____

   _____

d) Do you hold any leadership position in the group? ____(0=NO; 1=YES) If YES, what
   position do you hold?   **1 = Chairman; 2 = Secretary; 3 = Treasurer, 4 = Supervisory
   committee, 5 = Other, specify**: _____

e) In your area do you receive extension services? _____1=YES 0=NO
   IF, YES, who provides the service?_____(Code) **1 = National govt; 2 =   County
   govt; 3= Cooperative;   4 = coffee marketing ; 5= management agents; 5 =
   Promoter farmers; 6= Other farmers/ neighbours; 6 = Other, specify:** _____

   If NO, give reasons: _____

   _____

8. COFFEE SELLING

a) Which months do you usually harvest coffee? _____ (list all codes that apply)
   1 = Jan, 2 = Feb, 3 = Mar, 4 = Apr, 5 = May, 6 = Jun, 7 = Jul, 8 = Aug, 9 = Sept, 10 =
   Oct, 11 = Nov, 12 = Dec
b) Distance to collection point (Factory) : ------------------   kms

c) Mode of transport: **1 = by foot , 2 = motorbike, 3 = bull/donkey cart 4= hand-cart, 5=
   car, 6 = truck 7 = other, specify:** _____

d) Price received per kg of cherry and Mbuni   :Cherry: _____ KShs   Mbuni:_____ KShs

e) How do you get paid? _____ (list all that apply)
   1 = Cash 2= Cheque 3= Bank Transfer, 4 = other, (specify) _____

f) How long do you wait to get paid after coffee delivery? _____ (months/days)

g) Did you borrow operating capital in 2016 and 2017?
h) If yes,
   i. How much money in KShs did you borrow in 2016 and 2017?

2016		2017	

   ii. How much interest did you pay in year 2016 and 2017?

2016		2017	

i) How do you spend your income from coffee (enter % for each item)?

Expenditure Item	% of coffee income	Expenditure item	% of coffee income
Food		Insurance	
Shelter		Hire of labour	
Clothing		Inputs for coffee production	
Health		Inputs for other crop production	
Education		Loan repayments	
Savings		Other, specify: _____	
		Total:	**100% (check)**

j) How do you cope with the effects of climate change? _____

_____

_____

Co -operative Governance

1. For how long have you been a member of the Cooperative society?
   a) *Above 15 Years*   ☐
   b) *10- 15 Years*   ☐
   c) *5-10 years*   ☐
   d) *Below 5 years*   ☐

2. What services do you receive from the FCS?
   a. *Extension services*   ☐
   b. *Market information*   ☐
   c. *Financial credit facilities* ☐

|

    d. Other (specify)   `   ☐ --

     -

3. On a scale of 1 to 5 where 1 is dissatisfied and 5 satisfied, how satisfied are you with the services provided by the Cooperative society?

        Satisfied 5. ☐   *4.* ☐   *3.* ☐   *2.* ☐   *1.* ☐   *Dissatisfied*

4. If answer is 2 and 1 above, what areas would you like the cooperative society to improve?

    _____
    _____
    _____

b) ESTATE FARMER QUESTIONNAIRE

1. GENERAL INFORMATION

Date of Study (DD/MM/YYYY)	/ /	
Enumerator's Name		
Respondent's Name		Gender (a):
Estate code		
Estate Name		
County Name		

2. ASSETS – LAND AND LIVESTOCK
b) Land

Number of Parcels	Size of parcel(code)	Tenure system (Code)	If parcel is _owned,_ who owns (Code)
1			
2			
3			
4			
Total farm:			

Size of parcel	Tenure System	If Owned, Name on title/certificate:
1= acre 2= ha 3= other, specify: _[conversion in metric system]_	1= Title deed 2= Owned but not titled 3= Community land 4= Lease 5=Other (specify)	1= Male household 2= Female household 3= Joint household

3. GOOD AGRICULTURAL PRACTICES(GAP)

c) How long have you been in coffee farming? _____ (years)

d) Complete the table below, for the variety/type and number of coffee trees on the farm:

Coffee Varieties	System* under which it is grown (code)	Current number of trees	Area in Acres
SL 34			
SL 28			
K7			
Ruiru 11			
Batian			
* System			

Note: *System: Pure stand=1; Intercropped=2; Shaded=3; Un-shaded=4 (enter <u>ALL</u> those that apply).

c) What is the average yearly cherry production on your farm? _____ (kg) and how much was the price per kilo?

Year	Kgs	Price per Kg
2012		
2013		
2014		
2015		
2016		

d) Which of the GAPs do you practice on your farm? (Tick)

- x. *Use of improved seed* ☐
- xi. *Inorganic fertilizer use* ☐
- xii. *Organic fertilizer use* ☐
- xiii. *Soil conservation* ☐
- xiv. *Pest and disease control* ☐
- xv. *Harvesting operations* ☐
- xvi. *Post-harvest practice/care* ☐
- xvii. *Soil testing* ☐
- xviii. *Coffee tree nursery management* ☐

e) Have you received any form of training on Good Agricultural Practices on the farm?

- c) Yes ☐ *(**ASK f to h below**)*
- d) No ☐ **(SKIP TO 4)**

f) If Yes at **(2)** from whom did you receive the training?

- d) SMS (Mobile Text)
- e) Professional Training
- f) Others (specify)_____

g) If Yes to the answer above, specify on areas where you have received training.

_____
_____
_____

h) How would you gauge your level of training on Good Agricultural Practices?

- v. Excellent
- vi. Very good
- vii. Average
- viii. Poor

4. COST OF COFFEE PRODUCTION

a) How much did you spend in the last year on coffee farming activities?

Field Activity - Cost (KSHS)	No of times per year	2012	2013	2014	2015	2016	2017
Labour costs (See 5b.)							
✓ **Hand Weed control**							
✓ **irrigation application**							
✓ **Herbicide application**							
✓ **Irrigation application**							
✓ **Conservation(terracing, shade trees, mulching)**							
✓ **Fungicide Application**							
✓ **Fertilizer application**							
✓ **Pruning**							
✓ **Manure application**							
Chemical costs							
Soil Improvement – Ground Fertilizer							
• **CAN**							
• **NPK**							
• **Manure**							
Foliar Feeding							
• **Monar|Tomek|Wuxal Boron|Nutrivant|,Urea, e.Salt| etc.**							
Disease Control							
• **Cabrio | Nordox |Delan|Nativo|Michrothiol**							
Fungicide Control							
• **Copper|Cabrio|Delan|Daconil| Quandris| Nativo|,Captan etc.**							
Pests Control							
• **Dursban|DC Tron|Diazinon|Dursban**							
Soil Amelioration							
• **Lime, Rock phosphate, Gypsum**							
Insects Control							
• **Actara, Bouviteck, Decis, Fursban, Microthiol etc.**							
Others (Please specify)							

b) Source of Labour?   1. ☐   2. ☐   3. ☐
1= **Family labour 2. = Hired labour 3. = Mixed (1&2)**
*If family labour ask for time and **1**calculate wage equivalent*

c) Other Crop costs:

	Cost per unit	No of units	Total Cost
Picking in debes			
Transport bags			
Cherry transport to the factory in debes			

d) Complete the table below for the other Food/cash crops sales

Food/ Cash crop	Area allocated (Acres)	Intercropped with coffee (Yes/No)
1.		
2.		
3.		
4.		

e) Other Farm income generating Activities

----

5. GROUP MEMBERSHIP, ACCESS TO CREDIT, TRAINING AND COFFEE INFORMATION SERVICES

f) Are you a member of any farming related self- help group or co-operative society? _____
(0 = No, 1 = Yes)

g) If yes, what year did you join? Group ---------------------------

h) What services do you get? from the:
i) Group: _____

_____

i) Do you hold any leadership position in the group?   ___(0=NO; 1=YES) If YES, what position do you hold?   **1 = Chairman; 2 = Secretary; 3 = Treasurer, 4 = Supervisory committee, 5 = Other, specify**: _____

j) In your area do you receive extension services? _____1=YES 0=NO
f) IF, YES, who provides the service?_____(Code) **1 = National govt; 2 =   County govt; 3= Cooperative;   4 = coffee marketing ; 5= management agents; 5 = Promoter farmers; 6= Other farmers/ neighbours; 6 = Other, specify:**_____

g) If NO, give reasons:
_____

_____

6. COFFEE SELLING

k) Which months do you usually harvest coffee? _____ (list all codes that apply)
   1 = Jan, 2 = Feb, 3 = Mar, 4 = Apr, 5 = May, 6 = Jun, 7 = Jul, 8 = Aug, 9 = Sept, 10 =
   Oct, 11 = Nov, 12 = Dec

l) Distance to Dry Mill : ------------------   kms

m) Mode of transport: **1 = motorbike, 2 = car, 3 = truck,   4 = other, specify:**
   _____

n) Price received per kg of cherry and Mbuni   :Cherry: _____   KShs   Mbuni:_____
   KShs

o) How do you get paid? _____ (list all that apply)
   1 = Cash 2= Cheque 3= Bank Transfer, 4 = other, (specify) _____

p) How long do you wait to get paid after coffee delivery? _____ (months/days)

q) How do you spend your income from coffee (enter % for each item)?

Expenditure Item	% of coffee income	Expenditure item	% of coffee income
Food		Insurance	
Shelter		Hire of labour	
Clothing		Inputs for coffee production	
Health		Inputs for other crop production	
Education		Loan repayments	
Savings		Other, specify: _____	
		Total:	**100% (check)**

r) How do you cope with the effects of climate change?   _____

_____

_____

_____

o

7. What are the main Factory expenses?

	Cost per Year (KShs)					
Expense	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Salaries/wages						
Power						
Processing materials						
Office administration						
Others, Specify						

8. Does the Factory keep records? ☐ Yes (1)   ☐ No (2)

   If YES, which ones? ☐ Cherry   ☐ Parchment ☐ Members ☐ Stores   ☐ others,_____
specify:

_____

If No, why:
_____
_____
_____
_____

Coffee Processing Costs, Volumes and Revenues:

9. Complete the tables below:
9a.Coffee Volumes and prices

Year	No. of coffee trees	Total Cherry delivered (Kg)	Total parchment delivered to mill(Kg)	Total clean (Kg)	Total Mbuni (Kg)	Total hulled Mbuni (Kg)	Average price of the cherry (KShs)	Average price of Mbuni (KShs)	Total pay-out per kg cherry (KShs)
2012									
2011									
2014									
2015									
2016									

9b. Coffee processing costs

Year	Processing labour	Measuring equipment /scales	Drying materials (nylex, coffee netting)	Sisal bags/twines	Power for processing	Transport to dry mill	Water and Others	Total Processing costs
2012								
2011								
2014								
2015								
2016								
2017								

9c. other factory indirect costs

Year	2012	2013	2014	2015	2016	2017
Factory Manager						
clerical staff/supervisor						
electricity /Fuel						
AGM expenses						
stationary and telephone						
Others						

10. Does the estate have any other sources of income apart from coffee? ☐ Yes (1)   ☐ No (2)
   If YES, what are the other sources of income?
   a. Selling food crops   ☐ Yes (1)   ☐ No (2)
   b. Selling other cash crops   ☐ Yes (1)   ☐ No (2)
   c. Selling dairy and poultry   ☐ Yes (1)   ☐ No (2)
   d. Other, specify:

11. If other income streams come from selling food or cash crops, please indicate which ones:
☐ a. tea   ☐ b. Wheat   ☐ c. maize   ☐ d. potatoes
☐ e. bananas   ☐ f. beans   ☐ g. other, specify: _____

12. How much money was received by the Estate from coffee sales in the last 5 years?

Year	Amount(KShs)
2012	
2013	
2014	
2015	
2016	
2017	

13. How much money did the Estate receive per debe of cherry in the last 5 years?

Year	Amount(KShs)
2012	
2013	
2014	
2015	
2016	
2017	

14. Does the Estate maintain any certification?
☐ Yes (1)   ☐ No (2)

15. If yes, please fill in the following table

	Certification title				
	RA	**UTZ**	**4C**	**Fair trade**	**COMBI**
Average annual cost					
Average annual sales					
Average annual Premiums					

16. Please comment on the benefits of the certification to the coffee sales in the last two years

_____

_____

_____

Environmental Awareness

17. Does your Estate strive to lower its negative impact on nature and the environment?
    ☐ Yes (1)   ☐ No (2)
   If YES, what negative impact is your Estate actively trying to reduce?
    ☐ Water waste (1) ☐ deforestation (2) ☐ soil degradation (3) ☐ other, specify:_____

    _____

18. What action are you taking to decrease the negative impact?
_____
_____
_____
_____

19. Do you borrow operating capital?

    If yes,

i. How much money in KShs did you borrow?
ii. How much interest did you pay

Year	Amount Borrowed	Interest Paid
2012		
2013		
2014		
2015		
2016		

20. What are the key challenges affecting the Co-operative/Union?
☐ Infrastructure ☐ Availability of funds ☐ Weather (low rainfall)
☐ Performance of farmers ☐ Access to domestic power
☐ Lack of quality traders ☐ other, specify: ---

Future Plans

21. What are your Estate plans for the next 3 years?

_____

_____

_____

c) WET MILL QUESTIONNAIRE

General Information:

Date of Survey (DD/MM/YYYY)		/ /	
Enumerator's Name			
Co-operative Society		**Wet Mill (Factory)**	
County			
Secretary Manager (CEO)			**Gender(a):**

Factory Details:

1. Membership

Year	No. of members (a) Total	Men (b) Active	(c) Non active	Women (d) Active	(e) Non active	Youth (below 35 years) (f) Active	(g) Non active
2012							
2013							
2014							
2015							
2016							
2017							

2. How often (in years) are new leaders elected? _____

3. What is the number of staff in the Wet Mill? _____
   Male_____ Female_____ Youth_____

4. What are the main Factory expenses?

Expense	Cost per Year (KShs) 2012	2013	2014	2015	2016	2017
Salaries/wages						
Power						
Processing materials						
Transport						
Office administration						
Others, Specify						

T

5. Does the Wet Mill keep records? ☐ Yes (1) ☐ No (2)

   If YES, which ones? ☐ Cherry   ☐ Parchment ☐ Members   ☐ Stores   ☐ Others,_____
specify:

_____

If No, why:
_____
_____
_____
_____

6. Are the earnings of the Wet Mill (partly) reinvested in the Wet Mill?

        ☐ Yes (1)   ☐ No (2)   If Yes, what %tage on average--------------
----

Coffee Processing Costs, Volumes and Revenues:

7. Complete the tables below:

7a.Coffee Volumes and prices

	2012	2013	2014	2015	2016	2017
Cherry 1 intake						
Cherry2 intake						
Total Cherry intake						
Clean coffee sold(Kgs)						
Clean coffee sold(KShs)						
Ratio of Cherry to Clean						
Average price per kg of Cherry						
Average price per kg of Clean						

7b. Coffee processing and Marketing costs

	2012	2013	2014	2015	2016	2017
Factory Expenditure						
Marketing Expenditure						
Total Expenditure						

7c. other factory indirect costs

Year	2012	2013	2014	2015	2016	2017
Factory Manager Costs						
clerical staff/supervisor Costs						

U

Management committee/Honoraria						
AGM expenses						

7d. How much money did the wet mill pay to farmers per debe / Kg of cherry in the last 5 years?

	2012	2013	2014	2015	2016	2017
Rounded Rate Grade 1						
Rounded Rate Grade 2						

8. What is the average acreage of coffee per farmer in the Wet Mill _____acres?

9. Does the Wet Mill society have any other sources of income apart from coffee? ☐ Yes (1)
☐ No (2)
   If YES, what are the other sources of income?
   a. Selling food crops   ☐ Yes (1)   ☐ No (2)
   b. Selling other cash crops   ☐ Yes (1)   ☐ No (2)
   c. Selling dairy and poultry   ☐ Yes (1)   ☐ No (2)
   d. Other, specify:

10. If other income streams come from selling food or cash crops, please indicate which ones:
☐ a. tea   ☐ b. Wheat   ☐ c. maize   ☐ d. potatoes
☐ e. bananas ☐ f. beans
☐ i. other, specify: _____

11. Does the factory maintain any certification?
☐ Yes (1)   ☐ No (2)

12. If yes, please fill in the following table

	Certification title				
	RA	**UTZ**	**4C**	**Fair trade**	**COMBI**
Average annual cost					
Average annual sales					
Average annual Premiums					

13. Please comment on the benefits of the certification to the coffee sales in the last two years

_____

_____

_____

Capacity building:

14. Do you offer extension services to your farmers on coffee? ☐ Yes (1)   ☐ No (2)

    If YES, which extension services do you offer? *(Select __ALL__ that apply)*
    ☐ Trainings   ☐ Information   ☐ Advisory services
    ☐ Other, specify: _____

15. Do you use Promoter Farmers in your extension services?   ☐ Yes (1) ☐ No (2)
    If YES, how many? _____ and how many farmers does each promoter farmer work
with? _____

16. How many of the promoter farmers are: a. Male___   b. Female_____
17. Has the Wet Mill society received any training in 2017 on?
    a. Governance   ☐ Yes(1) ☐ No(2)
    b. Post-harvest management and waste reduction   ☐ Yes (1)   ☐ No(2)
    c. Good Agricultural Practices on coffee   ☐ Yes (1)   ☐ No (2)
    d. Good Agricultural Practices on dairy production   ☐ Yes (1)   ☐ No (2)
    e. Good Agricultural Practices on food crop and intercropping ☐ Yes (1)   ☐ No (2)
    f. Nutrition   ☐ Yes (1)   ☐ No (2)
18. Who provided the trainings in Q18?
        ☐ Marketing Agent (1)   ☐ Union (3) ☐ NGO (3)   ☐ Government (4)
        ☐ Other, specify: _____

19. Has the Wet Mill trained its members in 2017 on?
    a. Governance ☐ Yes (1)   ☐ No (2)
    b. Post-harvest management and waste reduction ☐ Yes (1)   ☐ No (2)
    c. Good agricultural practices   on coffee ☐ Yes (1)   ☐ No (2)
    d. Dairy production ☐ Yes (1)   ☐ No (2)
    e. Good agricultural practices on Food crop and intercropping ☐ Yes (1)   ☐ No (2)
    f. Nutrition ☐ Yes (1) ☐ No (2)

Services

20. Do you offer to farmers services other than farm inputs and marketing? ☐ Yes (1)   ☐
No (2)
    If YES, what service do you offer? ☐ Healthcare (1)   ☐ Insurance (2) ☐ Financial
linkage (3)
        ☐ Other, specify:_____

Gender and Youth

21.   What is the current board composition?
      a. Men   _____ Women _____Youth _____

22. Are the women able to vote in the selection of new leaders/board members? ☐ Yes (1)
        ☐ No

23. Are the youth able to vote in the selection of new leaders/board members? ☐ Yes (1)
☐ No

24.   What activities are women and youth involved in the Wet Mill?
Women_____
_____
_____
_____

Youth:_____
_____

25. Has the Wet Mill received any training on gender in the past 3 years? ☐ Yes (1)   ☐
No (2)
    If yes, who facilitated the workshop? ☐   Marketing Agent (1) ☐ Union (2) ☐   NGO
    (3) ☐   Other, specify:
    _____
    _____

26.   Has the Wet Mill provided any training on gender in the past 3 years? ☐   Yes (1) ☐
No (2)

27.   Does the Wet Mill actively involve woman in the decision-making processes of the Co-
operative?
        ☐ Yes (1)   ☐ No (2)
    a.   If YES, what steps are taken to involve them? Please elaborate
        _____
        _____
        _____

    b. If NO, give reasons:_____
        _____
        _____

28. Are there any programs in place to support women?
        ☐ Yes (1)   ☐ No (2) If YES, ~~which ones?~~_____
        _____
        _____

29. Does the Wet Mill/union have any activities in place to engage young people in coffee
farming and support their development as future coffee farmers?   ☐ Yes (1)   ☐ No (2)
If YES, which activities have been put in place?_____
_____
_____

X

If NO, give reasons:_____
_____
_____
_____

30. Has the Co-operative organized any training programs in 2016 aimed specifically at youth?

   ☐ Yes (1)   ☐ No (2) If YES, which areas did the training cover:_____

   _____

   _____

Environmental Awareness

31. Does your Co-operative society strive to lower its negative impact on nature and the environment?

   ☐ Yes (1)   ☐ No (2)

  If YES, what negative impact is your co-operative society actively trying to reduce?

   ☐ water waste (1) ☐ deforestation (2) ☐ soil degradation (3) ☐ Other, specify:_____

   _____

32. What action are you taking to decrease the negative impact?

_____
_____
_____
_____

33. Do you borrow operating capital?

  s) If yes,

      i.   How much money in KShs did you borrow? How much interest did you pay

Year	Amount Borrowed	Interest Paid
2012		
2013		
2014		
2015		
2016		

34. What are the key challenges affecting the Co-operative/Union?

   ☐ Infrastructure ☐ Availability of funds   ☐ Weather (low rainfall)

   ☐ Performance of farmers   ☐ Access to domestic power

   ☐ Lack of quality traders ☐ Other, specify:_____

<u>Future Plans</u>

35. What are your co-operative society plans for the next 3 years?

_____

_____

_____