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Sustainability Assessment of Smallholder Coffee Farmers in Nyeri and Kisii Counties, Kenya

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ABSTRACT OF THESIS submitted by:

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Some estimates put the daily consumption of coffee to be over 1.4 billion cups. 25 million farmers in 51 coffee producing countries are said to depend on the cultivation of Arabica and Robusta coffee. In Kenya, approximately 52,000 MT of coffee valued at US$160 million were sold at the national coffee auction in 2008/2009. In 1989, the global coffee market faced a price drop that affected the coffee value chain. Smallholder farmers were particularly affected by this. The 1987/1988 production levels of coffee prior to the price decline are often quoted to show Kenya's unutilised potential. For example, in 2010/2011 Kenya produced only 50,000 MT. Smallholder farmers account for 60% of Kenya's coffee production. It is for this reason that they have been singled out as the potential drivers toward the realisation and surpassing of the 1987/1988 coffee production levels. Smallholder farmers are important because they directly contribute to the rural and national economies and by so doing to national stability. Their direct interactions with the environment and nature of coffee farms have negative impacts to the environment and society but also positive contributions that should be reinforced.

This potential and its barriers will be explored by applying the Sustainability Assessment of Food and Agriculture (SAFA) Framework which have been developed by the Food and Agriculture Organisation of the United Nations (UN) through a consultative, multi-stakeholder process aimed at address growing needs for a standardised framework and a common language covering all aspects of sustainability.

Keywords: Coffee, Kenya, SAFA, Smallholder

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Abbreviations

AGM	Annual General Meeting
BOD	Biochemical Oxygen Demand
CAN	Calcium Ammonium Nitrate
CBD	Coffee Berry Disease
CBK	Coffee Board of Kenya
COD	Chemical Oxygen Demand
CS	Cooperative Society
DAP	Diammonium Phosphate
FAO	Food and Agriculture Organisation of the United Nations
FCA	Full-cost accounting
FPIC	Free, Prior and Informed Consent
GHG	Greenhouse Gas
K7	Kent (K) variety K7
KPCU	Kenya Planters Cooperative Union
Kshs.	Kenya Shillings
NCE	Nairobi Coffee Exchange
NCPB	National Cereals and Produce Board
NEMA	National Environmental Management Authority
NPK	Nitrogen-Phosphorous-Potassium fertilizer
OTA	Ochratoxin A
SA	Sustainability Assessment
SAFA	Sustainability Assessment of Food and Agriculture
SI	Sustainability Indicator
SL	Scot Laboratory (28 and 34)
TFP	Total Factor Productivity

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The reality, of which core professionals perceive only the simplified shadows, is in contrast a diversity: of people, of farming systems and livelihoods, each a complex whole, concrete and changing. But professionals reconstruct that reality to make it manageable in their own alien analytic terms, seeking and selecting the universal in the diverse, the part in the whole, the simple in the complex, the controllable in the uncontrollable, the measurable in the immeasurable… For the convenience and control of normal professionals, it is not the local, complex, diverse, dynamic and unpredictable reality of those who are poor, weak and peripheral that counts, but the flat shadows of that reality that they, prisoners of their professionalism, fashion for themselves (Chambers, 1997)

1 Introduction

Coffee was introduced in Kenya in the 1890s by French and Scottish Missionaries who were experimenting on the suitability of different sites types to coffee (Conway, 2001). This coffee came to be known as "French Mission Coffee" which was a result of breeding of various varieties of coffee to cope with diseases, pests and drought (Mureithi, 2008). Later varieties that were developed include Scot Laboratory (SL) 28 and 34, Blue Mountain, Kent (K) variety K7, and K20, and Ruiru 11(Mureithi, 2008). By 1987 Kenya was producing 130,000MT (A.M Karanja & Nyoro, 2002). However, this peak growth was stopped by the 1989 collapse in coffee prices which affected the global coffee market.

Kenya's coffee is grown in the highlands between 1,400 and 2,000 metres above sea level. The main growing areas are around Mt. Kenya, Nakuru and Machakos (Chege, 2013). Most of Kenya's coffee is grown on small farms organized into cooperative societies (CSs) and plantation/large estates (A. M. Karanja, 2002). According to the Coffee Act (2001), the distinction between small and large farms is determined by the size of the farms and ownership of pulping stations.

Kenya's coffee is marketed internationally as Kenya Arabica grade AB which is classified as E, AA, AB, PB, C, TT and T (Kenya, 2001). The grade is determined by size, density and liquor quality. The main processing methods employed are wet and dry processing (Central Coffee Research Institute, 2008). Wet processing results in higher quality parchment coffee than buni produced from dry processing. Between 2004 and 2009 there was an average of 91% of coffee that underwent wet processing (Chemonics International Inc., 2010).

The coffee season which is known as the crop year runs from 1st October to 30th September of the following year (Kenya, 2001). This season covers cultural practices (Appendix B), processing (Appendix C) and marketing of coffee. Picking of coffee normally happens in December and

April. Farmers are required by this Act to deliver their coffee to co-operative factories for primary processing (Appendix C). The co-operatives subsequently deliver pulped beans to millers for milling and the millers deliver coffee to registered marketing agents. However, some smallholder farmers who are far from CSs use hand pulpers to process their coffee in their farms (Gitonga, 2004; Karanja and Nyoro, 2002). Marketing is done through the Nairobi Coffee Exchange by registered marketing agents who are responsible for cleaning, classification and warehousing (Conway, 2001; A.M Karanja & Nyoro, 2002; Kenya, 2001). More than 75% of Kenya's coffee is exported to the European Union (A.M Karanja & Nyoro, 2002; Scholer, 2006)

1.1 Problem definition

Important sustainability considerations arise when the Kenyan coffee market is analysed. Coffee was Kenya's leading foreign exchange earner from 1963 to 1989 (A. M. Karanja, 2002). Therefore, declining quantity of coffee has had an effect in reduced foreign exchange earnings from agriculture to the Kenyan economy from an average of 60% before 2002 to 25% thereafter (Condliffe, Kebuchi, Love, & Ruparell, 2008; Gathura, 2013; Gianessi & Williams, 2012). Smallholder farmers have been especially affected by this decline and this has had an impact on rural economies (A. M. Karanja, 2002). In addition, the organization of the coffee market doesn't allow for full and effective participation of smallholder farmers (Gathura, 2013).

Coffee farms are located around ecologically sensitive areas such as Mt. Kenya and therefore, require close monitoring. Processing methods used consume a lot of water and discharge effluent rich in organic material that can affect Biochemical Oxygen Demand and Chemical Oxygen Demand (Wintgens, 2004). If left unchecked this could have adverse impacts on biodiversity.

It is estimated that 95% of coffee in Africa is grown by farmers on farm holdings ranging from 1 to 2 hectares (Centre, 2011; Zhou, 2010). In Kenya, it is estimated that 60% of coffee is produced by smallholder farmers (Chemonics International Inc., 2010; A.M Karanja & Nyoro, 2002). These

statistics show that there is need to pay special attention to coffee smallholders as they have the potential to cause major environmental and social harm if they are undertaking unsustainable practices (Sell, 2007). They also have the potential to generate multiple goods (coffee yields) and services (watershed, pollination services, natural pest control, etc.) as well help in reducing hunger and poverty if they are employing good practices (Zhou, 2010).

In order to address sustainability challenges in agriculture, industry and governments have responded by developing sustainability standards. While these aspire to define in detail what sustainability means for the sector in general or specific supply chains in particular, the standards also face challenges on a number of fronts: there are too many of them, their impacts are not clear, and they are not always easy to apply. This proliferation of tools, ideas, discourses has led to confusion as a result of continuous restructuring of research and policy programmes because new approaches are introduced before old ones are fully understood (Nhamo & Inyang, 2011). Some examples of initiatives include labelling schemes such as Fairtrade initiative, UTZ certification, rainforest alliance, and the 4C Association (Centre, 2011). The ignorance of indigenous and local knowledge and their perception of being inferior have also been noted as issues of concern in some of these programmes (Nhamo & Inyang, 2011).

Some of these issues are being dealt with by organizations such as International Social and Environmental Accreditation and Labelling (ISEAL) and FAO. For example, FAO undertook to develop a meta-standard in SAFA Guidelines by coordinating with existing meta-initiatives and tools. FAO is also working on components of a sustainability assessment and definitions in order to facilitate common understanding and equivalencies among different initiatives (FAO, 2013). SAFA has been developed to be an adaptable assessment approach that views agricultural systems from the four dimensions of sustainability: good governance, environmental integrity, economic resilience and social well-being. It is aimed at allowing enterprises to carry out assessment without the need for external experts.

Other forms of assessment methodologies exist. Some like Committee on Sustainability Assessment (COSA) indicators and Response-Inducing Sustainability Evaluation (RISE), have been adapted specifically for the smallholder farmers but have differences in language and structure. The challenge however, is that these tools require experts to carry out (COSA, 2013; Grenz, 2012).

Smallholder farmers do not have the same resources and capacities to carry out detailed scientific tests as large scale farmers. They also do not have the manpower and man-hours to carry out assessments when compared to large companies which have dedicated experts. The approach adopted by SAFA aims at addressing the wellbeing of flora, fauna, farmers, families, communities, businesses, retailers and all other stakeholders along the value chain that depend on assessed products (FAO, 2013). However, the current SAFA guidelines were developed specifically for mid-sized and large enterprises. The next steps will involve the adjustments to meet specific needs of smallholder farmers. This research will look at some aspects that can feed into this work.

1.2 Justification of research

The choice of a species for study must be based on what society and authorities know and understand (Ten Brink, 1991). Coffee has ranked among the top foreign exchange earners in Kenya for many years. In 2008/2009 alone, approximately 52,000 kg of coffee valued at US$160 billion were sold (Chemonics International Inc., 2010). At the global level, coffee consumption has been increasing steadily at an annual growth rate of 1.6% between 1993 and 2003 to reach 6.8 million MT (Condliffe et al., 2008).

In addition, coffee has been selected for this research because of the relative abundance of data from extensive research carried out in the sector. Arabica coffee farms are located in the proximity of ecologically sensitive areas such as forests, wetlands and rivers in the highland

regions of Kenya. They can therefore provide an indication of the condition of these areas, and may have important impacts on areas of high biodiversity.

The focus on Kenya and specifically on two different regions has been adopted because agricultural systems are dynamic and evolve to respond to changes within their environmental and socioeconomic contexts (Horrigan, Lawrence, & Walker, 2002). The SAFA framework has been selected because the realisation of sustainable agriculture requires a system wide approach that considers farm management problems within the social and food system context (Horrigan et al., 2002). This is provided by the holistic approach that the SAFA framework provides by considering elements of governance, environment, society and profitability.

2 Objectives and research questions

This study aims to determine whether SAFA guidelines, which have been developed based on global standards, can be used to assess and identify key areas of concern facing smallholder farmers in coffee cultivation and processing in Kenya. The following questions will guide the research:

1) What are the main sustainability concerns and challenges in coffee cultivation and processing, relevant to sustainability assessment?
2) How can SAFA be adjusted to make it useful for the context of coffee smallholders in Kenya?
3) What lessons can be drawn for applying SAFA to other smallholder farming systems?

The answers to these questions will contribute to efforts being carried out to develop assessment methods that use a common approach and language to produce beneficial and comparable results of interest to smallholder farmers and other relevant stakeholders.

2.1 Hypothesis

A common global standard on sustainability assessment can be a useful starting point for developing more context-specific assessments.

2.2 Scope

This research is focused on smallholder coffee farmers in Muringato (Nyeri County[1] – Box 2-1), Manga-Isecha, Gesangero and Kegogi (Kisii County[2] – Box 2-2) in Kenya. The scope of the

[1] http://www.nyerionline.com/about-nyeri-county/

analysis extends to other crops, individuals and processes within the sphere of influence of the smallholder coffee farmers (See Figure 3-2). Consumption, transportation, retailing, roasting, packaging, end-of-life, and manufacturing aspects in the life-cycle of coffee have been excluded from this research because of the limited influence that smallholder farmers have on them.

Box 2-1 Nyeri County

Nyeri County is located 150 km north of Kenya's capital Nairobi, in the country's densely populated and fertile Central Highlands. The latter lie between the eastern base of the Aberdare (Nyandarua) Range, which forms part of the eastern end of the Great Rift Valley, and the western slopes of Mount Kenya. Nyeri County is mostly known for its two main cash crops (coffee and tea), with the dairy industry and tourism also playing an important part in its economy.

For a long time, coffee and tea boosted the local economy, before a slump witnessed in the late 1990s dealt a major blow to the region. Land ownership is largely smallholder; the drier part of the landscape is dominated by ranches and large scale irrigation.

Box 2-2 Kisii County

Kisii County is located to the south east of Lake Victoria. It covers an area of 1,317 sq. km. The county has two rainfall seasons - short (September - November) and long (February - June). Temperature ranges from +16 to +27 degrees Celsius. Kisii County is famous for its soap-stone but agriculture (tea, bananas, maize, coffee and dairy) is the main economic activity. The county has a very high population density (874 people/sq. km); 51% population live below poverty line.

2.3 Audience

This research is addressed to smallholder farmers, their cooperatives and other relevant stakeholders that are in search of farm assessment methods aimed at improving the welfare of farmers, enabling them to produce positive externalities from applying sustainable practices, and

[2] http://www.myaspirantmyleader.com/10-counties/60-kisii-county.html

reducing their adverse impacts on the environment and the society. The research will be of interest to the Natural Resources Management and Environment Department, FAO, who are working on developing SAFA guidelines for smallholder farmers, and the Agricultural Production and Protection Department of FAO, who are seeking to document good practices in agro-ecology and ecological intensification. It will also be of interest to the broader standards' and sustainability assessment community.

2.4 Report structure

This report is structured into the following chapters:

Chapter 1 presents the nature of the problem to be addressed and identifies the scope and audience of the research.

Chapter 2 outlines the objectives and research questions.

Chapter 3 provides an analysis of approaches used in the sustainability assessment of agriculture. This identifies the main gaps that the research will address, and presents the thematic framework used for data analysis based on literature review.

Chapter 4 identifies key problems facing coffee cultivation and processing in Kenya.

Chapter 5 presents and justifies the methods used and limitations of the research.

Chapter 6 presents the main findings from the interviews.

Chapter 7 discusses and reflects on the findings in relation to the analytical framework.

Chapter 8 summarises the main findings and lessons learned in the course of this research, highlights main research contributions and provides suggestions for further research.

3 Sustainability Assessment in Agriculture

Sustainability assessment in agriculture is needed as a tool to provide and show the benefits of sustainability for farmers. Carrying out assessments not only enables farmers to understand their farm activities but allows them to build a database of information and records, which can be used to support environmental, social and other claims. This information could be utilised in communications and marketing of the produce and sustainable farm practices (Auld & Gulbrandsen, 2010). Sharing this information with consumers may also help in the development of stories that improve the visibility of farmers and help them attain better prices.

Assessments are carried out to help in making decisions and improve performance (Morrison-Saunders & Pope, 2013). Farmers that carry out sustainability assessments can gain knowledge and a better understanding of their produce and processes, because they are forced to think about their routine activities from a different perspective while responding to questions. The foremost benefit of carrying out a sustainability assessment by farmers is the raised awareness and increased appreciation of the issues that indicators try to address, along with an appreciation of their own good agricultural practices. This may aid in the identification of poor practices and promote the adoption of sustainable production and processing practices, which could improve efficiency and ultimately reduce costs and environmental harm. Effective monitoring and measurement may also help farmers better identify pests and diseases, key natural materials, energy inputs and outputs, and maintain soil health. This, it can be argued, will help farmers come up with suitable and timely interventions. Suitable interventions such as the elimination or substitution of harmful pesticides and herbicides for less harmful ones will have both long- and short- term benefits to the health of the farmers and the environment. However, sustainable development would not merely require avoidance and doing better but by sufficient avoidance of negative impacts and sufficient enhancement of positive impacts (Hacking & Guthrie, 2008).

Pinter et al., 2012 view sustainability assessment as a useful tool that can aid decision making through direct influence on policy making or an influence on citizens, farmers and farmer groups. This could work both ways by allowing citizens, farmers and farmer groups to directly influence decision making based on key findings obtained from sustainability assessments if the assessments identify policy levers.

Economic tools such as Total Factor Productivity (TFP) have been used to assess the performance of agricultural systems on the basis of profitability and maximizing utility of inputs (Comin, 2006). In the Cobb Douglas equation used to calculate TFP, an increase in capital or labour will lead to an increase in productivity. Logically, at least from a farmers' perspective, an increase in productivity would lead to an increase in income. This approach, like many other economic approaches, externalises some costs (especially those accrued on the environment). For example, nutrients provided from the soil are not directly accounted for nor paid for. In this approach, only items that can be assigned a monetary value influence the productivity of the farming system, which results in the exclusion of other social and environmental factors that influence sustainability.

3.1 Boundaries

Do farming systems have boundaries? If so, where do they reside?

Spatial and temporal boundaries exist for farming systems, like in other systems. The consideration of where to draw the line becomes important when trying to determine what should be considered as sustainable or unsustainable. This decision would affect whether to consider individuals, collection of farms, or their inter-linkages with other systems outside the farming system(s). No system can exist in isolation and boundaries are permeable. No matter how boundaries are drawn, any system provides an influence on and, in turn, is influenced by factors outside its boundaries (Global Reporting Initiative, 2005).

The determination of boundaries also has an influence on the level of detail useful for different audience. For example, national and regional statistics are too coarse to provide users with specific information to problems they are facing (Nhamo & Inyang, 2011). Therefore, boundaries have to be drawn to meet the targeted audience. However, considerations still have to be made regarding existing variations that may affect results. A similar field may have significant differences in nutritional status or biological diversity within very narrow distances depending on the slope, habitats of insect populations, or previous activities. Even when the focus is on the smallholder farmer, it is important to go beyond local factors and consider long-distant impacts on ecosystems and people (Pinter, Hardi, Martinuzzi, & Hall, 2012). Figure 3-1 presents how these inter-relations between farmers and the CSs in relation to biophysical and human dimensions.

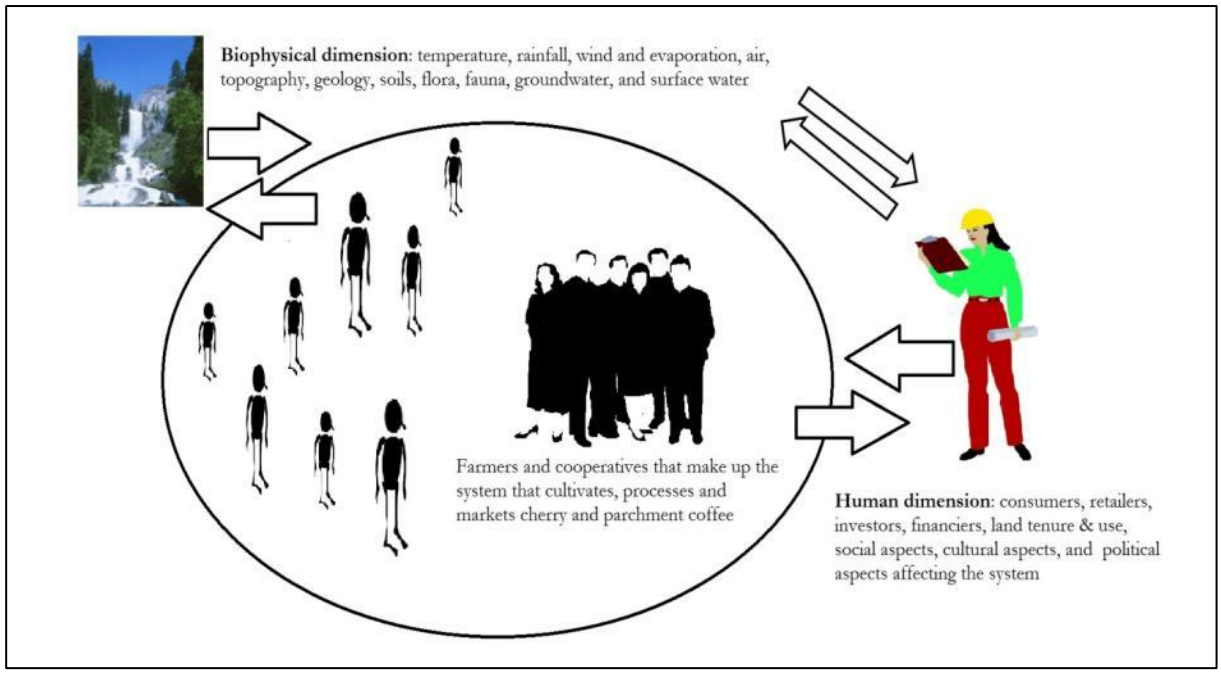


Figure 3-1: System boundaries and interactions between different actors in the system

Source: adapted from Nhamo & Inyang, 2011

How long is long enough to determine whether a system is sustainable or not?

It is recommended that the time horizon should span "both human and ecosystem time scales"(Hacking & Guthrie, 2008; Pinter et al., 2012). This approach takes into account the fact that variations in the environment naturally exist. Some level of foresight is required to determine the farm activities that can adversely and irreversibly affect both present and future generations of humans and ecosystems.

When considering time, it is interesting to note that some time-related terms used in assessments are likely to introduce subjectivity, which may influence results because of people's personal values. These include terms like: current, future, improve, conserve, maintain, and enhance. Time becomes an important factor because one can prove just about anything by selecting convenient time boundaries (Huff, 1954).

3.2 Indicators

What you measure is what you value

The choice of indicators is fundamental in assessing sustainability and the results that come from these assessments. Sustainability indicators (SI) can help in increasing participation, which can lead to a better understanding of any complex social issues surrounding local agriculture (Hayati, Ranjbar, & Karami, 2010). This allows for accountability by setting criteria by which individuals and groups can be held accountable, identification and prioritization of values, and making decisions based on these results (Pinter et al., 2012). The following are characteristics for effective SIs:

- **Simplicity:** chosen indicators must be selected with the intended users in mind and be presented in a form that make them easily understood. They should be as few as possible and as many as necessary. The indicators and underlying data must also be easily

accessible and comprehensible (Bell & Morse, 2008; Pintér, 2013; Pinter et al., 2012; Van Passel & Meul, 2012).

- **Scope**: indicators must cover the diversity of issues in sustainability dimensions but provide users with the information they need with as little overlap as possible (Bell & Morse, 2008; Van Passel & Meul, 2012).
- **Quantification**: the SIs should be measurable, drawn from recognized measurement systems to allow for comparability and credibility, and include data obtained from remote sensing (Bell & Morse, 2008; Pintér, 2013).
- **Assessment**: the SIs should allow trends with time to be determined (Bell & Morse, 2008).
- **Sensitivity**: the SIs should be sensitive to change e.g. by selecting suitable indicator species that are sensitive to changes in the environment (Bell & Morse, 2008).
- **Timeliness**: the SIs should allow timely identification of trends (Bell & Morse, 2008).

It is, however, important to note that reality is complex when selecting indicators and coming up with decisions based on these indicators. For example, the environment can vary within a certain range and still remain within the planetary boundaries associated with the planet's biophysical sub-systems or processes (Rockström, 2009). What is measured may also not necessarily be available when and where it is needed and measured. The choice of indicators should therefore, consider spatial and temporal variations that occur normally and naturally in the environment.

Types of indicators include (FAO, 2013):

1. **Target** - whether the entity has plans, policies or monitoring, with targets and ratings based on steps towards implementing them.

2. **Performance/results/outcome/state** - focused on the results of compliance with an objective and can measure the performance of an operation, identify trends and communicate results.
3. **Practice/prescriptive/process/pressure/control/driving force** - gauge a process that, in turn, will influence a state SI and prescribe the necessary tools and systems be in place to ensure best practices.

3.3 Definitions/Language

Many frameworks, initiatives, standards and indicators have been developed in recent years, each with the objective of improving environmental and social impacts. Each of these tools has developed its own language and structure (FAO, 2013; Nhamo & Inyang, 2011). Previous sections have shown, for example, that challenges exist even at the level of defining a smallholder farmer or the meaning of sustainable agriculture.

3.4 Inclusion and participation

"In healing, the patient is widely expected to participate actively in the diagnosis and cure. By contrast, scientific knowledge as observed in development practice generally represents the superior knowing expert as an agent and the people being developed as ignorant, passive recipients or objects of his knowledge" (Hobart, 1993)

Inclusion and participation of farmers in the development, application and use of results from sustainability assessments is largely wanting. Frameworks are mostly developed and assessments are carried out for policy makers, politicians, or scientists that are keen to know how regions, provinces or countries are performing (Bell & Morse, 2008). For example, version 3.0 of the SAFA guidelines was developed through a "peer-review" process, stakeholder surveys, cooperation with ISEAL Alliance, sustainability concerned partners in academia, associations, food industry, multi-stakeholder organizations, as well as within the UN system and FAO (FAO, 2013). There is no explicit mention of the participation of smallholder farmers in the development of these guidelines.

Unlike companies that have some leeway to set their own goals based on their areas of expertise and interest (provided that they meet statutory requirements) farmers are mostly subjected to criteria and goals that are determined predominantly by consumers, retailers, governments and other upstream actors in the supply chain. This is because of the top-down nature of many sustainability assessments that are seen mostly as tools to help in policy making. In this set-up, farmers appear as informants to be used in showing how good a country is performing to an external audience or to convince consumers to buy products. In addition, farmer face capacity and resource constraints that hinders them from carrying out assessments.

3.5 Reductionism

"Not everything that counts can be counted, and not everything that can be counted counts." Albert Einstein[3]

The world is admittedly a complex place. Humans have had to come up with simplifications of this complexity by coming up with signs and symbols to avoid drowning themselves in the intricacies of life. However, the challenge is in the manner in which simplifications are made because misleading conclusions arise from careless simplification.

As mentioned before, sustainability is a social construction. It therefore, becomes problematic to assign negative or positive weights to issues such as the use of child labour in farms: should child labour be seen as a means of perpetuating indigenous knowledge to future generations and upholding traditions or is it a denial of children's rights to education? This should be considered when determining how to score indicators and the interpretation of results. It further underscores the importance of this research in coming up with contextualized assessments that assign weights

[3] http://www.brainyquote.com/quotes/quotes/a/alberteins100201.html

depending on their relative actual or societal significance (Phillis & Andriantiatsaholiniaina, 2001; Van Passel & Meul, 2012).

3.6 Causality

Changes in an ecosystem can be caused by non-human, naturally occurring factors. This increases the complexity of assigning responsibility for certain occurrences. For example, the climate change debate has been engulfed with the question on whether the changes are truly naturally occurring events. Uncertainty caused by shortcomings of existing knowledge and the existence of unknown events which cannot be anticipated also limits the ability to calculate and assign impacts (Hacking & Guthrie, 2008). The influence of spatial and temporal scales is an important factor in that should be considered when determining causality.

3.7 Subjectivity

(Gomez-Limon & Sanchez-Fernandez, 2010) state that Sustainability Assessment (SA) needs to be specifically formulated to fit different geographical and temporal conditions due to the fact that it is a social construction that changes with different societies. This flexibility is what has led to challenges in coming up with a common approach for measuring sustainability. In addition, this flexibility has led to the development of composite indicators using subjective methods and different approaches that has led to inconsistency and limited the impact on policy (Gomez-Limon & Sanchez-Fernandez, 2010; Pinter et al., 2012). Terms that are likely to introduce subjectivity include those that describe relative space (local, regional), time (current, future, improve, conserve, maintain, and enhance), effect (beneficial, harmful), state (good, bad, worse, safe, harmful), and values (unacceptable, admirable) (Bell & Morse, 2008).

3.8 Usefulness/Practicability of assessments

Each certification scheme has its own set of reporting mechanisms, and evaluation criteria. Assessments have come to be seen by farmers as mere formalities that are aimed at appeasing investors or gaining some form of market advantage (Karue, 2014). This may be true to some extent, especially when those carrying out the assessments and those being assessed see no value in the process since they were not included in the development of the certification schemes nor are the audience of these assessments. Farmers are faced with long and impractical lists of indicators requiring the collection of both quantitative and qualitative information in economic, social, governance and environmental spheres (Van Passel & Meul, 2012). Due to these and other highlighted challenges, most of the reports emanating from the top-down SAs are of little or no use to farmers (Haas, 2002). This is because of the aggregation of results, and comparison of different regions and different production systems makes it harder to identify specific remedial action (Gomez-Limon & Sanchez-Fernandez, 2010; Van Passel & Meul, 2012). In addition, aggregated indices also run the risk of being misinterpreted (Pinter et al., 2012).

4 Coffee in Kenya

It would be incorrect to conclude that the Kenyan market is on a continual downward trend simply based on 1987/1988 as the reference year as seen in Figure 3-4. This is especially because the socioeconomic, geographical, and geopolitical landscape has since changed. Examples of changes include increase in population size and growth in infrastructure (Lang, 1995).When compared to yearly production (Figure 3-5), different conclusions could be drawn regarding the coffee production levels in Kenya which shows that the choice of statistical averages affects results. These examples highlight the importance of proper selection of time boundaries as well as data collection and analysis approaches.

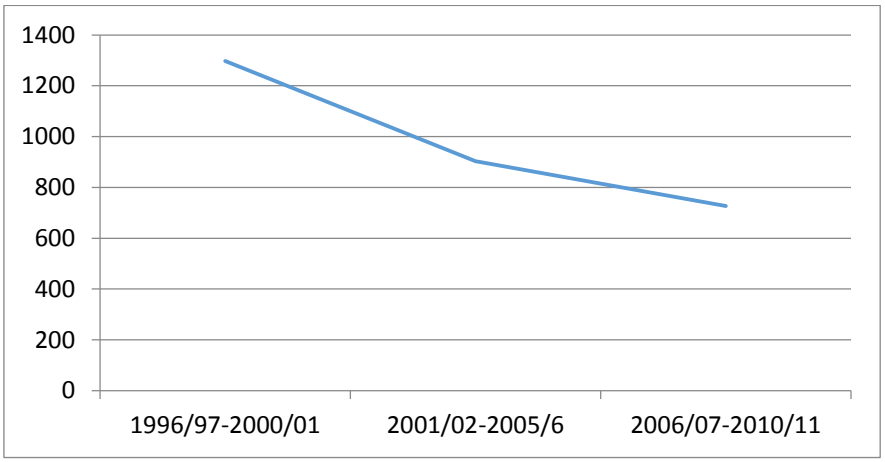


Figure 4-1: Average production in Kenya, 1995/96–2010/11 ('000 bags)

Source: (ICO, 2013)

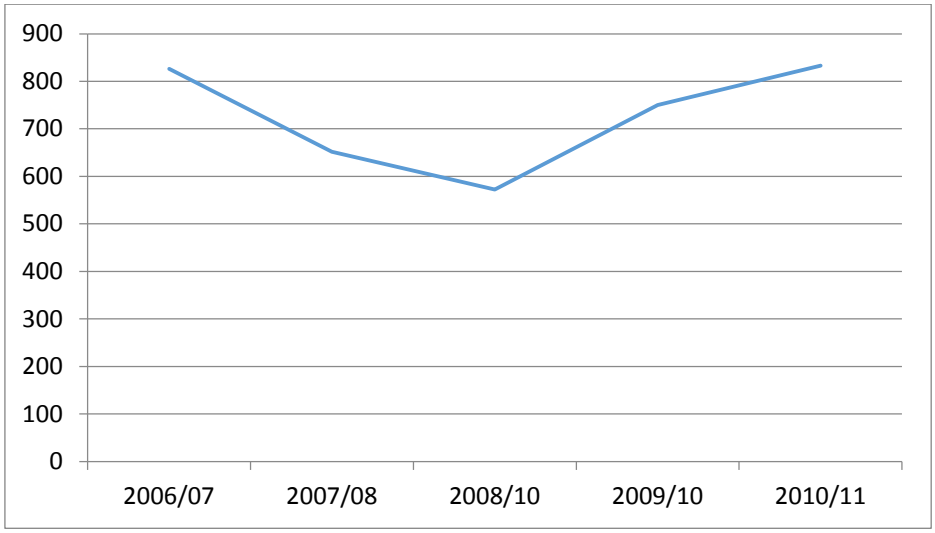


Figure 4-2: Yearly production in Kenya, 2006–2011 ('000 bags)

Source: (ICO, 2013)

A look at more contemporary factors would provide a better picture on the existing situation and help in coming up with specific adapted solutions. For example, this would look at pests and diseases which have affected both quantity and quality of Kenyan Coffee. The main diseases that affect coffee in Kenya are Coffee Leaf Rust and Black Rot. Coffee leaf rust affects the development and maturity of beans by causing defoliation (CAB International, 2006). Black rot affects leaves, developing berries and young shoots and has the potential to cause up to 20% crop loss if not controlled (CAB International, 2006). Main pests include, *inter-alia*, caterpillars which may be found in some shade trees, Coffee Berry Borer (*Hypothenemus hampei*), white coffee stem borer (*Monochamus leuconotus*), white coffee stem borer (*Monochamus leuconotus*), Green scales which are carried by ants, Coffee Root Mealybug, and Root-knot nematodes (Gianessi & Williams, 2012). These pests can lead to total crop loss in addition to lower weight, quality and flavour of coffee (CAB International, 2006).

The decline in production is also attributed to cutting of shade trees. Efforts to increase the number of coffee bushes as well as misinformation from literature resulted in the cutting down of

these shade trees. Lack of shade also increases the requirement of more pesticides and fertilizers (Wintgens, 2004).

Fertilizers and pesticides are key inputs in coffee production. Main fertilizers used are Calcium ammonium nitrate (CAN); Nitrogen, Phosphorous, and Potassium (NPK) which is also referred to as Compound 17:17:17; Diammonium phosphate (DAP); and Ammonium sulphate nitrate (ASN). The application of fertilizer is needed at critical stages such as flowering. This is needed for the proper growth of roots, stem and vegetative parts regardless of the amount of crop that is harvested (Central Coffee Research Institute, 2008). However, proper application is needed because over application of fertilizer can increase soil acidity. Soil pH can also be corrected by the application of alkali forming soil amendments like agricultural lime (Calcium Carbonate), dolomite (Calcium and Magnesium Carbonates) (Central Coffee Research Institute, 2008).

Some of the pesticides and herbicides used include Benzene Hexachloride, Decis (Deltamethrin) , Dieldrin, Dursban (Chlorpyrifos), Endosulfan, Ethion (Rhodocide), Fenitrothion, Fenthion, Furadan (Carbofuran), Mashal (Carbosulfan), and Ultracide (Supracide) (Central Coffee Research Institute, 2008). Some of them are broad spectrum/non-selective and have adverse effects on the public health and on biodiversity (CAB International, 2006). Cultural and biological methods such as the use of natural predators should also be used. However, CAB International (2006) point out that no single approach can effectively deal with pests.

Rural-to-urban migration has had an impact on labour availability in some parts of Kenya. Workers are moving to urban towns in search of higher incomes. Under Regulation of Wages Order (2013), the minimal wages for general casual labourers (exclusive of house allowance) in all areas outside major cities and municipalities should be Kshs. 5,218/month, Kshs. 264.50/day or Kshs. 48.85/hour (Kenya, 2013). However, rural farmers get paid less than this.

Coffee in Kenya is normally grown in water rich areas and irrigation is not normally needed for cultivation. On the other hand, a lot of water is consumed during the processing of parchment coffee. Between 2004 and 2009, there was an average 91% of coffee underwent wet processing (Chemonics International Inc., 2010). The main steps in wet-processing that require a lot of water include cleaning of soaking tanks, fermentation tanks, pulping tanks, and pulping unit; grading of coffee; cleaning and soaking of coffee: and cleaning of gunny bags. Cherry coffee avoids the need for water treatment. These processes also lead to the odour emanating from the fermenting beans and decomposing waste material which affects air quality (SAI Platform, 2009).

Improper disposal of used pesticide bottles and excessive and improper application of pesticides and fertilizer can affect water quality when there is surface run-off or seepage. Coffee effluent from the pulping units is highly acidic and contains high amounts of dissolved and suspended biodegradable organic matters. This affects Biological Oxygen Demand (BOD) and Chemical Oxygen demand (COD).

The decline in coffee quality is an issue of concern because quality is a key determinant of the value that coffee fetches at the market. Kenyan coffee is graded by size and density and classified by quality (Kenya, 2001; LMC International & ProForest, 2006). Quality is determined by the combination of the physical appearance of the green bean and the roasted coffee and more importantly the cup quality after tasting (LMC International & ProForest, 2006).

Table 4-1: Coffee characteristics and processes that affect quality

Characteristic	**Processes that affect quality**
Presence or absence of extraneous material like stones or twigs	Drying and cleaning
Wrinkled beans	Drying
Cracking/shrunken and boat shaped beans	drying
Nipped or deformed coffee	Pulping
Overall cup quality (aroma, thickness of the brew, taste, flavour and acidity)	Picking, storage, washing, soaking, cleaning, pulping, and fermentation,
Fruity cup	Pulping
Mustiness or foxy beans	Fermentation
Foxy beans	Bagging
Mould (Ochratoxin a)	Drying, diseases, and pests

Source: Central Coffee Research Institute, 2008

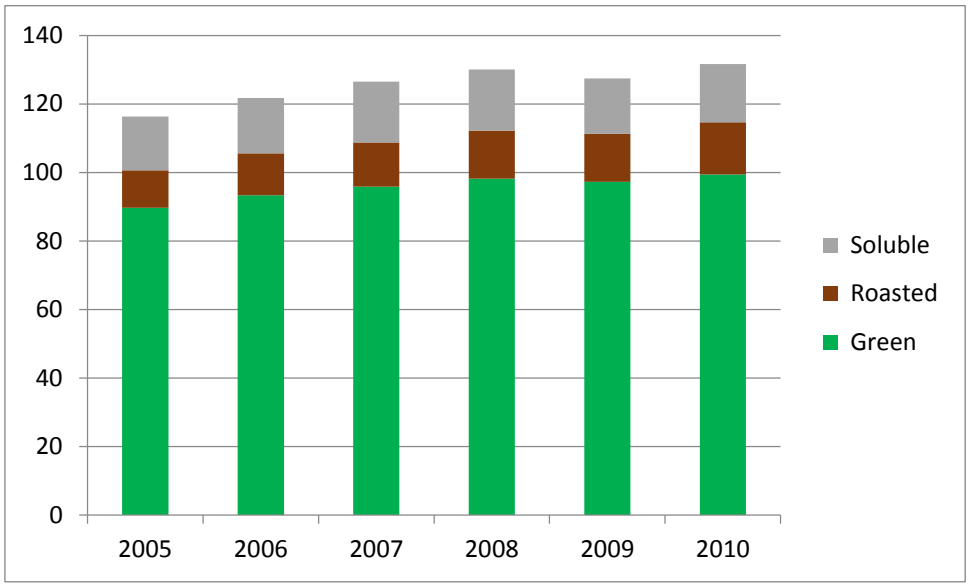


Figure 4-3: World gross and net imports of coffee, 2005–2010 (in millions of bags)

Source: (ICO, 2013)

Coffee Board of Kenya[4] is responsible for promoting coffee and providing advice on coffee production and quality enhancement. Agricultural extension officers provide advice to farmers

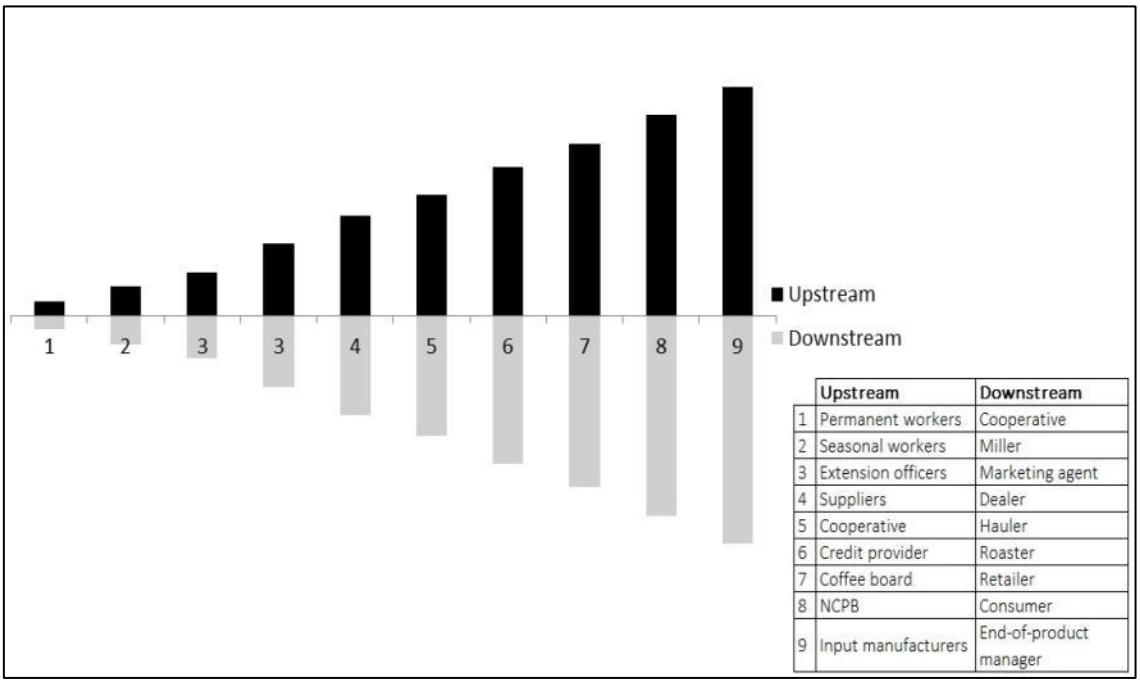
[4] http://www.coffeeboardkenya.co.ke/index.php/aboutcbk/introduction/our-functions/1-our-functions

and organize farmer field schools to train farmers on various issues. Limited access to extension services has had an impact on the cultural practices necessary for coffee. Appendix E provides an overview of the coffee value chain (Appendix E).

Coffee cultivation areas such as Nyeri were initially on forested land (Lang, 1995). This deforestation and land conversion has resulted in a shift from ecologically diverse habitats to monoculture farming. This may erode plant and animal biodiversity and affect ecosystem connectivity (Horrigan et al., 2002). This as well as other factors such as the input of fertilizers, livestock husbandry and manure storage have contributed to the emission of Greenhouse gases (GHG)(Sevenster & Verhagen, 2010). It is estimated that agriculture is responsible for 20% of human generated GHG emissions (Horrigan et al., 2002).

5 Methodology

This study used an embedded, multiple-case study approach with Nyeri and Kisii Counties in Kenya as the main areas of focus. These counties were selected because they are important coffee growing zones in Kenya. The case study approach was selected because it provided an opportunity to study and describe coffee farmers in their natural setting using qualitative techniques (M. Bloor & F. Wood, 2006). Triangulation was used to identify contextual factors specific to coffee production in Kenya. In determining the spatial and temporal boundary for carrying out this research the level of influence and significance of impacts from the point of view of smallholder coffee farmers were considered upstream (suppliers of inputs) and downstream (recipients of outputs) as shown in Figure 5-1.



	Upstream	Downstream
1	Permanent workers	Cooperative
2	Seasonal workers	Miller
3	Extension officers	Marketing agent
4	Suppliers	Dealer
5	Cooperative	Hauler
6	Credit provider	Roaster
7	Coffee board	Retailer
8	NCPB	Consumer
9	Input manufacturers	End-of-product manager

Figure 5-1: Decreasing level of influence upstream and downstream of coffee value chain

Source: author based on SAFA guidelines and interviews

5.1 Data collection

Interviews and observations were the primary source of information because of limited existing data due to poor record keeping, sampling challenges, lack of data collection knowhow, and limiting costs such as soil assessment charges or tools to measure water and air concentration at the smallholder level (FAO, 2013). Interviews were carried out during site visits in February and April 2014 in Nairobi, Nyeri (Fig. 5-2) and Kisii (Fig. 5-3) Counties in Kenya.

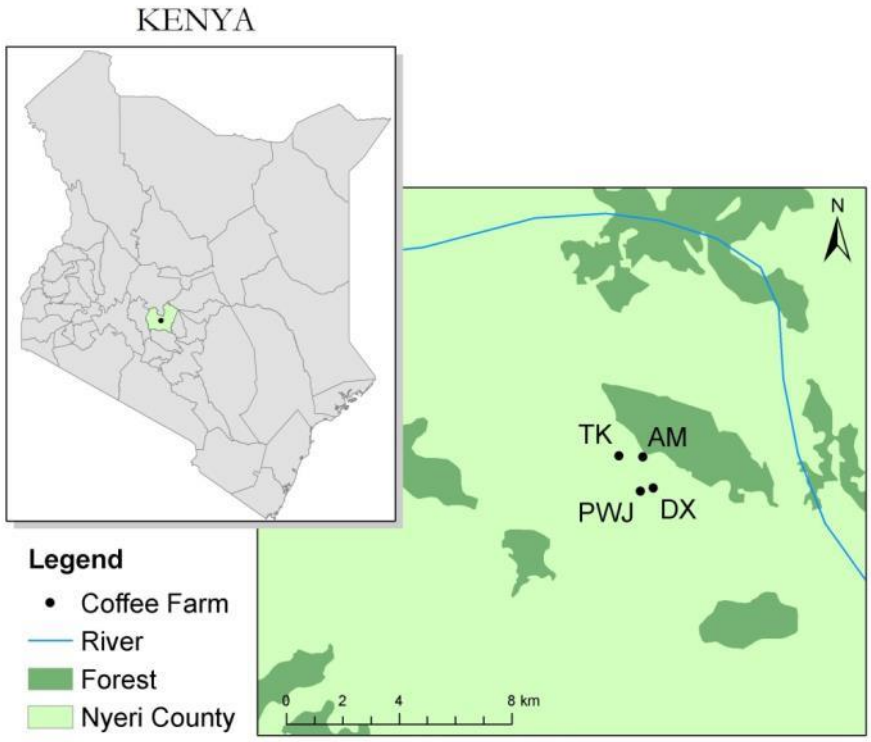


Figure 5-2: Map showing location of interviewed farmers in Nyeri County, Kenya

Source: (Nilson, 2014b)
Data sources:
Counties: http://www.arcgis.com/home/item.html?id=5f83ca29e5b849b8bo5bc0b281ae27bc
Data points: Author
Forests: http://www.wri.org/resources/data-sets/kenya-gis-data
Rivers: http://www.naturalearthdata.com

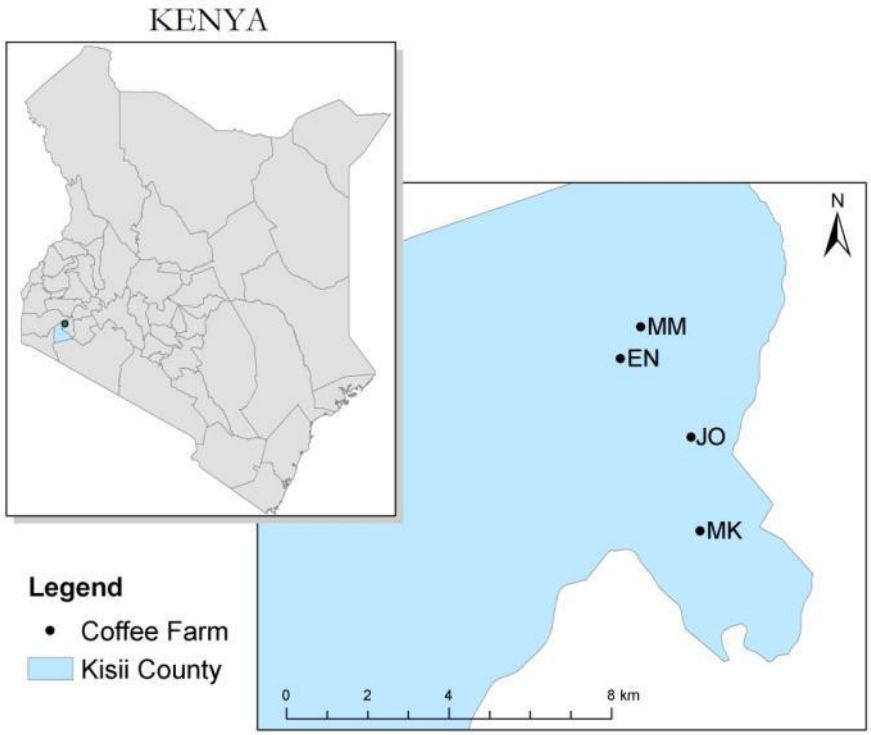


Figure 5-3: Map showing location of interviewed farmers in Kisii County, Kenya

Source: (Nilson, 2014)
Data sources:
Counties: http://www.arcgis.com/home/item.html?id=5f83ca29e5b849b8bo5bc0b281ae27bc
Data points: Author
Forests: http://www.wri.org/resources/data-sets/kenya-gis-data
Rivers: http://www.naturalearthdata.com

Semi-structured interviews were used to take into consideration varying literacy and understanding levels of the farmers as well as availability of information. This approach was selected because it provided farmer perspectives, allowed active engagement and offered flexibility in pursuing emergent issues (Simons, 2009). A total of 19 coffee farmers were interviewed in a mixture of Kiswahili, Kikuyu and English languages. Representatives of the NCE and 2 dealers were also contacted as key informants because of their understanding of the coffee market and their seniority in the coffee value chain in Kenya. The key informants were contacted before visiting the farmers because this helped in early analysis that could help identify gaps in the interviews (M. Bloor & F. Wood, 2006).

Contact persons were used to identify the interviewees and translators were used when necessary. Interviews were recorded with permission from the interviewees and were carried out at homesteads, farms, the Nairobi Coffee Exchange trading hall and sampling room, and offices of persons interviewed. The questionnaires were divided into the four sustainability dimensions: governance, environment, economy and social with questions exploring various themes and sub-themes under each dimension.

Secondary data from local newspapers, scientific journals, brochures, videos and books were used for background information on coffee cultivation and processing practices and designing the questionnaires. Deductive reasoning and extrapolations were used for some data that was not collected during the interviews.

5.2 Data analysis

Over 200 pages (single-space, Garamond 12pt) of transcribed interviews carried out in a mixture of Kikuyu, Kiswahili, Kisii and English languages were analysed. Coding was carried out to identify key issues classified under the SAFA sub themes(O'Reilly, 2009). This helped to come up with interconnections between various elements that had been coded. The structure of the database followed SAFA Guidelines version 3.0. A scale for ranking based on 5 levels of acceptability was used to assign a score for each indicator following SAFA Guidelines because qualitative data has no common or obvious meaningful unit of measurement (Phillis & Andriantiatsaholiniaina, 2001; Van Passel & Meul, 2012). The analytical framework (Appendix A) developed from the contextualised SAFA guidelines were used to assign performance ranking for each indicator. Table 5-1 shows a list of farmers that were interviewed for this research. Because of the sensitivity of some of the interviews, the names of the respondents have been contracted to pseudo-acronyms. These will be used to identify each farm in the findings sections. The table provides information regarding gender of the respondents, their respective CSs, relative size and location.

Table 5-1: List of interviewed farmers

Code	Gender	Cooperative Society	Size	Location
PWJ	F	Kamuyu	Large	Muringato
AM	F	Othaya	Large	Muringato
MG	F		Large	Muringato
TK	M	Mutheka	Small	Muringato
DX	M	Kamuyu	Small	Muringato
MK	F	Murumba	Small	Gesangero
JK	M	Murumba	Small	Kegogi
JO	M	Murumba	Small	Manga-Isecha
PO	M	Murumba	Small	Manga-Isecha
AN	F	Nyaigwa	Small	Kegogi
PM	M	Nyaigwa	Small	Kegogi
DK	M	Nyaigwa	Small	Kegogi
PZ	F	Nyaigwa	Small	Kegogi
NO	M	Nyaigwa	Small	Kegogi
EN	F	Nyaigwa	Small	Kegogi
MM	F	Nyaigwa	Small	Kegogi
VN	M	Nyaigwa	Small	Kegogi
ZH	F	Nyaigwa	Small	Kegogi
JK	M	Nyaigwa	Small	Kegogi

5.3 Conceptual framework

The SAFA Guidelines provided the independent variables used in this research. These are Good Governance, Environmental Integrity, Economic Resilience and Social Well-Being. The dependent variable was selected as Sustainable Agriculture. Fig. 5-4 presents the framework used.

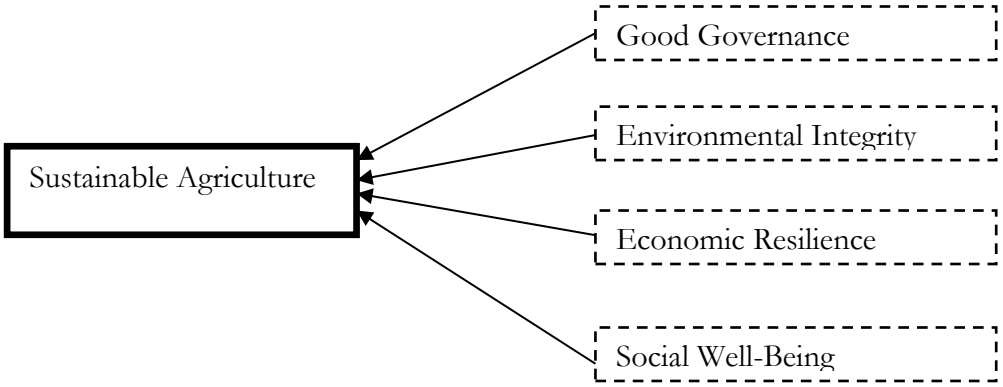


Figure 5-4: Conceptual framework

Source: adapted from FAO, 2013

5.4 Limitations

Spatial and temporal factors identified in preceding sections have an impact on the quality of data. This has an influence on the generalizability of results and should be considered when trying to draw extrapolations, conclusions or recommendations.

The importance assigned to different indicators, sub-themes, themes, and sustainability dimensions is affected by, inter alia, whether or not the tool used or the assessor adopts strong or weak sustainability approach. In *strong sustainability* there is little, if any, consideration of the financial or other costs of attaining sustainability. It equates to what some call ecological sustainability and the focus is primarily on the environment (Hediger, 2004). In this case, system quality is taken in terms of the physical measures of things (e.g. population, soil erosion and biodiversity). On the other hand, in *weak sustainability* costs of attainment are important and are typically based on a cost–benefit analysis, which inevitably involves trade-offs between environment, social and economic benefits (Hediger, 2004). Therefore, SAFA guidelines would be regarded as tending towards *weak sustainability* because by its very nature of being holistic, some trade-offs and balances inadvertently occur.

The interviews were carried out, transcribed and analysed by the same researcher. Therefore, some biases are likely to have been introduced. The semi-structured interviews resulted in a lack of uniformity in the number and type of questions asked. Some key information was lost because of communication barriers especially because not all the information was translated by the interpreters that assisted in carrying out this research. The sample size of 19 coffee farmers and differences (land size, number of trees, location) limit the generalizability of this research.

6 Findings

The following sub-sections present findings from the interviews that were carried out. SAFA guidelines have been used to categorize the findings into sub-themes under four sustainability dimensions: Governance, Environment, Economic and Social. These are further broken down into sub-themes and sub-theme goals based on version 3.0 of the SAFA Guidelines which has been applied *mutatis mutandis* with respect to the specific elements related to coffee in Kenya identified in literature. Each section will be preceded by a quote of the applicable SAFA sub-theme.

6.1 Governance

6.1.1 Mission statement

"The enterprise has made its commitment to all areas of sustainability clear to the public, to all personnel and other stakeholders through publishing a mission statement or other similar declaration (such as a code of conduct or vision statement) that is binding for management and employees or members" (FAO, 2013).

No written mission statements were found to exist or consciously applied in decision making. Many respondents however described their missions as being related to profit maximization (PWJ, DX, DK, and JS)

> *"To plant things that will give him money" JS*

Some farmers had mission statements that were not written but evidenced through actions and stated intentions.

> *"To have Ruiru 11 on SL28 over 1 acre of land so that other farmers may see the benefits of grafting and copy the same to propel the country forward" TK*
>
> *"To teach my children and leave a well-functioning and profitable farm for her children to take over", AM*

One farm may have had a mission statement but this was not known to the Manager. The work of these farmers was to simply do their work exactly as the proprietor wanted (MG). It was

observed that mission statements were not generally formulated by farmers or given importance at the field schools.

6.1.2 Due diligence

"The enterprise is proactive in considering its external impacts before making decisions that have long-term impacts for any area of sustainability"(FAO, 2013).

Some farmers were found to be proactive in considering their external impacts before making decisions that have long-term impacts for any area of sustainability. This was done through contacting extension officers, consulting agrochemists, attending field days, or inviting experts to carry out tests (PWJ, MG, AM, TC, and DX). Corrective measures were implemented to correct identified risks. For example, PM ceased planting any non-indigenous or water hungry trees like Blue Gum (*Eucalyptus globulus*) because of the risk they posed to water availability to his or neighbouring farms. There was however, no correlation between risk assessment and actual implementation of corrective actions. For example, DX was able to identify key internal and external risks but did not make any attempt to mitigate them. Other farmers did not carry out any risk assessment because they lacked the capacity to implement any change:

> *"Even if I did I don't have the means to do anything about it" JO*

6.1.3 Holistic audits

"All areas of sustainability in the SAFA dimensions that pertain to the enterprise are monitored or reported on", (FAO, 2013).

Only one of the sampled respondents showed signs of holistic audits carried out. In this case, soil samples were taken, external auditors checked whether workers had problems and the health of trees was checked (MG). Other farmers however, were mainly concerned with profitability by calculating costs of production (PWJ and AM) :

> *"If the money is good, everything else is good", AM.*

This sole respondent identified however, had carried out a soil test and had plans to continue doing this. Two farms (MK and ZH) said they had never carried out any audit and others said

they had informal auditing systems in place like scouting for diseases (MM), testing soil performance by checking productivity (TK and DX).

Insufficient records that were limited to profitability (income/kilo) were identified as a major obstacle in carrying out audits (PM). Records were not kept because calculations were done mentally (JO) and there was also no requirement to provide them (AN) , and no perception that they might help in making decisions..

> *"I just leave that (record keeping) alone because even if I were to keep records, I don't have anyone who I have to tell that I did this or that" AN*

Limited capacity, information and knowledge were also another obstacle. For example, many farmers in Kisii did not know the pesticides used in their farms because this was done by the CSs (JO, ZH, PM, PO, and JK). For PO this was simply because he had no interest. Farmers were unable to identify pests and diseases and ZH was not able to distinguish the difference between a pest and a disease. JS had never considered that his farm operations could affect the environment. JO did not know that fertilizer can affect the environment and only provided economic examples when asked what were the main problems facing his farm. In one farm (MG) audits were carried out but were only available to the proprietor.

6.1.4 Responsibility

"The owners of enterprise regularly and explicitly evaluate the enterprise's performance against its mission or code of conduct", (FAO, 2013).

Some farmers carried out regular self-assessments (TK, PWJ, and AM). PWJ kept notes in a notebook with information on all economic activities she was carrying. However, records were kept in Kikuyu language and were not well organised. AM filed records and was seen discussing with workers at the end of a working day to find out how they were performing. It was not possible to evaluate performance for farmers that did not have any known mission statement available like MG.

6.1.5 Transparency

"Procedures, policies, decisions or decision making processes are accessible where appropriate publicly, & made available to stakeholders including personnel & others affected by the enterprise's activities", (FAO, 2013)..

Farms had no written transparency policy in place but were welcoming and open to questions and feedback (AM, PWJ, EN, and TK). The accessibility of procedures, policies and decision making processes was found to be wanting. Some farmers only kept records that were available to them (PWJ and AM). Figure 6-1 shows and example of this. Procedures, audit reports, performance reports, and decision making processes were not known to workers in one farm (MG). ZH was found to be transparent with his workers by disclosing information to them and taking a representative of the pickers to the factory so that they could see how many kilos were collected.

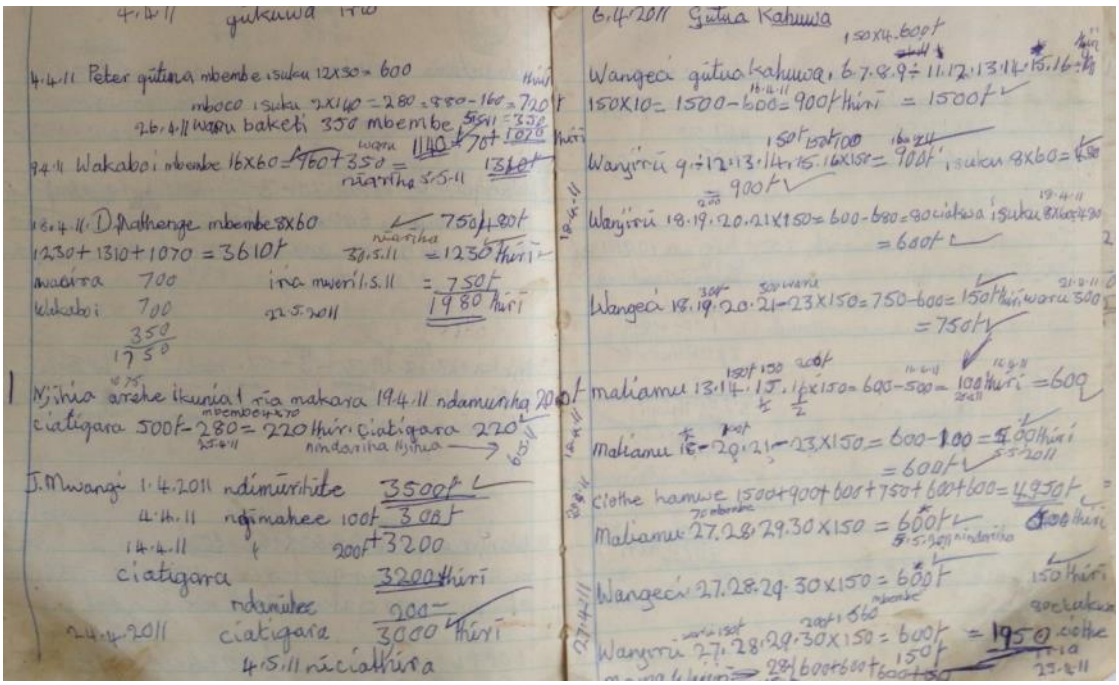


Figure 6-1: Example of record keeping (Photo by author)

Income from coffee was not shared with spouses in some cases (PO and PM). It was observed that farms normally designated one person to take care of all records (JK, MM and PWJ). As a result, information was lost whenever the designated person died or moved away (PZ, AN, and MK)

"My husband is the one who know much about coffee. I don't know much" MM

There was a sense of mistrust when carrying out some interviews. Some farmers were initially very hesitant to provide information before full identification of the research objectives (DX, JO, and AM). This was probably because of fear of reprisals.

Follow up questions and qualitative analysis identified some inaccurate information provided by some respondents. PWJ said that farm was always under coffee and but later admitted that it was a forest. TK said that Ruiru Research centre never came back after first visit and later said that that they came to give training to other farmers on his farm. DK was forced to retract statements when contradictions were pointed out on the varieties of coffee he was planting and on the use of pesticides. Other examples include, incorrect information on total income earned, land use change, level of knowledge, type of coffee planted, number of trees and quantity of yield (AN, EN, PZ, and MK). The sizes of farms are also questionable because farmers approximated to 1 acre or 0.5 acre whereas by observation some of the farms were smaller than what was stated.

Transparency was also shown by the invitation of representatives from millers, marketers and CSs to some farms (AM and PWJ). Some farmers were also open in discussing the challenges they faced with a view of receiving suggestions on how to improve

"I came running when I heard that you were carrying interviews so that I could learn from your", ZH

6.1.6 Stakeholder dialogue

"Ensures that it informs & engages with stakeholders that it affects in critical decision making", (FAO, 2013).

A key element of stakeholder dialogue in SAFA dialogue was the identification of stakeholders. Some farms had clearly identified their stakeholders and had developed ways to engage with them (TK). Examples of these stakeholders include transporters, labourers, parents, children, grandchildren, neighbouring farms, decision makers, farmer representatives, CSs, factories, coffee

board of Kenya (CBK), government, academic institutions, siblings (PWJ, DX, MK, AM, TK). However, farmers were not aware of key stakeholders such as NEMA (ZH, NO, and PM).

> *"I dont know who NEMA are but it would be nice for them to visit her so that we can get to know each other" ZH*

Stakeholder engagement was mostly carried out through discussions with labourers and attending meetings and farmer field schools (TK, PWJ, PZ, PO, and AM). Some farmers were proactive in contacting stakeholders like representatives from CSs and millers (AM and PWJ). Farmers that did not attend these meetings relied on proxies to bring feedback after they got back from the meetings (PWJ, MG, and DX). Attending meetings however, should not be seen as an effective indicator for stakeholder engagement because some farmers attend meetings but do not participate in them (VN).

A good example of stakeholder engagement is AM who regularly meets and discusses with workers to find out about how they are doing. On the other hand, the proprietor of MG remotely manages the farm and workers undertake directives issued from Nairobi, where the proprietor is based.

Providing information regarding activities that could affect the community or neighbouring farms was not evident. DX cited that neighbouring farms had put up residential units and others had left their farms unattended without prior information to them. In return, DX does not intend to consult or inform other stakeholders on plans to construct residential units. JS would only engage with stakeholders (e.g. neighbour) if his plans had a direct influence on them e.g. pipe going through their plot.

The identified challenges that hampered stakeholder engagement include: age difference (DX, PM), age (PWJ), hopelessness (DX), time (AN), individualism (DX), lack of education and knowledge (PM), and assigning no importance to these fora (JO, ZH, and MK).

6.1.7 Grievance procedures

"All stakeholders have access to appropriate grievance procedures, without a risk of negative consequences", (FAO, 2013).

The main avenue intended for raising grievances was identified as the Annual General Meeting (AGM) organised by the CSs (PO). Here farmers are ideally expected to give feedback and raise queries on issues such as misuse of funds. PO gives an example of such a query that led to someone who was found stealing kilos from farmers was fired. The AGM, as the name implies, only happens once a year. DK points out that the agenda for these meetings does not provide an opportunity for farmers to raise concerns and farmers are afraid of raising issues because this "could lead to their death". PZ says that farmers are not allowed to say anything in these meetings and even if they were to be given an opportunity to speak she would not feel confident to raise queries because they are afraid of being the only ones speaking up. Others like PWJ do not attend these meetings for health or other reasons identified in the preceding section.

Other fora like farmer field schools provide opportunities for farmers to meet and discuss issues (TK). Discussing issues with individual workers regularly also allows grievances to be raised (AM). Administrative chiefs also mediate when called upon whenever serious issues arise between neighbours (JK, DK). However, EN points out that there is nothing that administrative chiefs can do when it comes to dealing with corruption at the CSs. Because of this reason AN would do nothing if she witnessed corruption at the CS.

However, some farmers have lost hope and do not seek any avenues to raise their concerns (VN)

> *"There is nothing you can do but persevere" VN and MM*

Other farmers do not know where to raise concerns when they feel aggrieved:

> *"You can see something on the receipt but get a different amount of money and if you ask they will tell you that it is the machine that printed it out. So you wonder whether you are going to ask the machine questions or people". ZH*

A solution that is suggested for improving grievance procedures is collective action to avoid victimisation

> *"One farmer cannot just go and complain when others are silent. If we worked together it would have been possible" VN*

6.1.8 Conflict resolution

"Conflicts resolved through collaborative dialogue based on respect, mutual understanding & equal power", (FAO, 2013).

Collaborative dialogue based on mutual understanding and equal power was seen to be done through mediation through authorities. For example, MG enrolled NEMA when complaints between the farm and neighbouring farm regarding waste water emerged. Other issues are addressed by inviting extension officers who writes letters addressed to the assistant chief who would then summon disputing parties for discussions (PO). Dialogue between disputing parties was also carried out to resolve conflict (AM, MM, MK, EN, JO, and ZH). The avoidance of conflict was also seen to be an approach adopted by some farmers. For example, MG diverted waste water to another part of her farm to avoid conflict with neighbour. AM has made changes to her farm and increases security so as to avoid theft which was a source of conflict between her and the community. Legal measures were also suggested (JO)

Poor conflict resolution approaches suggested from the interviews include confrontation and revenge. JO stated that if these did not work he would resolve to confrontation by picking up a machete and cutting up the neighbour. DK state that he would deliberately harm others if they harmed him.

6.1.9 Legitimacy

"Compliant with all applicable laws, regulations & standards voluntarily entered into", (FAO, 2013).

Some of the farmers showed some level of awareness of existing laws that were applicable to coffee farmers. Identified laws include those on minimum wages (PWJ), prohibition of child labour (PWJ), minimum water quality requirements (MG), and requirements for a license to be

issued with a pulping license (TK). Awareness of existing laws however is not indicative of compliance. For example, PWJ still pays lower than legally required minimum wages. Compliance with legal requirements is exemplified by DK who stated that he does not plant the non-indigenous Blue Gum because it is not allowed by NEMA. This is because Blue Gum is thought to having a high water intake capacity (Oballa, Konuche, Muchiri, & Kigomo, 2010). On the other hand, there was an instance of lack of compliance whereby MK only partially complied with directive from NEMA requiring farmers to cut trees within 20 metres from rivers. Full compliance was not done because there was no follow up or inspection carried out by NEMA. Non-compliance with some legal requirements was identified. For example, providing notification to CSs whenever coffee trees are cut as required by Coffee Act 2001 was not done (JS and PM).

Legitimacy at the CS level was not seen to happen as some farmers pointed out that they were rampant with corruption (PO and EN). The rule of law in such cases is not seen to be applied and has been taken by some as societal norm:

"It is a must for corruption to take place" ZH

Lack of fairness was also observed in cases where more established farms had access to resources that smaller ones were denied. Examples include fertilizer and pesticides provided to MK and MM whereas other farmers in the same zones complained that they were not receiving assistance. In Nyeri, AM and PWJ had access to subsidised water whereas DX did not. AM had also entered into a deal with someone who would help her procure subsidised agrochemicals from the government.

6.1.10 Remedy restoration and prevention

"In case of any legal infringements or any other identified breach of legal, regulatory, international human rights or voluntary standard, the enterprise immediately puts in place an effective remedy & adequate actions for restoration & further prevention taken", (FAO, 2013).

There were no identified remedial measures to legal, regulatory, international human international human rights or voluntary standard.

No remedial measures aimed at correcting legal, regulatory, human rights or voluntary standards were identified. Examples of legal breaches include payment of lower wages than required (PWJ) or paying piece-rate wages (DX and MG)

However, some prevention measures such as not hiring children (PWJ, MG, and DX) or keeping non-indigenous or water hungry trees aware from rivers were in line with legal and regulatory requirements.

6.1.11 Civic Responsibility

"Within its sphere of influence, the enterprise supports the improvement of the legal and regulatory framework on all dimensions of sustainability and does not seek to avoid the impact of human rights, or sustainability standards, or regulation through the corporate veil, relocation, or any other means", (FAO, 2013).

At the smallholder level, participation in community meetings known as *barazas* and farmer field schools were found to be important in the development of norms and regulatory framework at the local level (PWJ, TK, and AM). Participation in the election of leaders for CSs is also seen as an important way of supporting the improvement of legal and regulatory frameworks because elected representatives are the voices of farmers (PO). The majority of farmers interviewed participate in voting even though some like AN do not find the process (queue-voting) to be transparent. ZH stopped voting after a desirable candidate lost. DX refuses to participate because he has witnessed bribing and fighting for key positions at the CS. MG is not engaged in other civic responsibility platforms such as community *barazas* or field schools that may contribute to the formation of rules and regulations because the farm is not in any CS.

> *"Those who are elected go there and eat our money and we go there to remove them when we see they are eating too much and we choose other ones who also come to eat" EN*

Exceptionally, DK is exerting pressure on District Cooperative Officer responsible for all CSs in Marani District (Kisii County) to provide information about how coffee is sold. Information has not been forthcoming.

6.1.12 Resource appropriation

"Do not reduce the existing rights of communities to land, water & resources, & operations are carried after informing affected communities by providing information, independent advice & building capacity to self-organise", (FAO, 2013).

Free, prior and informed consent (FPIC) was not seen to happen in some specific cases. For example, DX pointed out that neighbours did not consult when they set up residential units or left their farms unattended. Similarly, DX does not plan to consult with the neighbours when he uproots his coffee to put up residential units for university students. There was also no consultation with stakeholders to the farm managed by MG and AM when decisions were taken to discharge effluent from the pulping unit into the fields. JS would also only provide information to neighbours when his actions required installation of physical objects such as a pipe through the neighbouring farm. This would exclude consultation for pumping water from aquifers.

Some farmers like AM, PWJ, TK, MM and MG's proprietor bought their farms and have valid title deeds. Other farmers however, work on family land that they hold in trust on behalf of their families. In Kisii, women are not allowed to inherit paternal land which would mean that daughters of farm owners would only act as short term managers before the legitimate heirs took over. For example, MK comes from a family of 10 children with only 2 males that are presently not involved in managing the farm. MK would therefore, not invest too much in the farm because it could be taken away from her at any time. Other farmers that work on family land include NO, JK, ZH, DK, AN, and DX. For AN, the mother-in-law is in possession of the title deed following the death of her husband.

6.1.13 Sustainability management plan

"A sustainability plan for the enterprise is developed which provides a holistic view of sustainability and considers synergies and trade-offs between dimensions, including each of the environmental, economic, social and governance dimensions", (FAO, 2013).

Sustainability was seen to be equated to profitability to a majority of interviewed farmers (NO, AM). However, some considered elements of social welfare (PWJ) and continuity of their farms for future generations (MK and AM). Informal unwritten plans were shown by efforts aimed at improving farm performance by increasing productivity (TK), disease control (AM) increasing numbers of trees (JS and MK), improving farm operations for the benefit of children (AM and MK), shifting to include household waste as manure (MK), replacing traditional varieties (DX) and apiculture (ZH and MK). In one case, a plan was not available to employees but the proprietor seems to have a sustainability plan covering economic, social and environmental issues by timed audits and timely delivery of inputs. The failure to carry out plans was attributed to inability to follow through on them:

"*We do not do any budget because the money we get is so little. We use it for food and paying fees as soon as we receive it*", PM

6.1.14 Full-cost accounting

"Business success of the enterprise is measured and reported taking into account direct and indirect impacts on economy, society and physical environment (triple bottom line)", (FAO, 2013).

Some farmers exclusively looked into profitability by looking at yield and income in relation to other products that they had (JK, VN, DK, and DX). In addition to this, some farmers included the amount of work-hours and transport costs depending on the significance of these costs incurred by them (PWJ and DX). TK and DK keep financial records taking into account costs of picking coffee and calculate to see whether there is profit or not, compare performance of coffee with other products. DX calculates yield, labour, and transport. Examples of costs that are excluded include costs that would be incurred if family members were paid (EN) and costs

imposed on the environment like water quality, water extraction from underground water and GHG emissions.

Records were kept by some farmers (PWJ, AM and DK) but reporting was generally not carried out and was only available to the proprietor for personal use (PWJ, AM, DK and MG). AM however, had feedback sessions with her staff and could discuss issues with her workers.

6.2 Environment

No actual performance data: ambient air concentration but, waste water quality – no processing occurs on site. No targets or plans

6.2.1.1 Greenhouse gases

"The emission of GHG is contained", (FAO, 2013).

The determination of the GHG balance was not carried out during this research. The focus was on the identification of practices that could cause or help to reduce emissions of GHGs and foster their sequestration. Farms in Nyeri (PWJ, DX, AM, MG and TK) were evidently located on converted forest lands. Some of these farms which were previously owned by British settlers had already been converted from forests before the farmers took ownerships (MG and DX). DX has however, continued to carry out deforestation with freshly cut tree stamps seen. Some farmers in Kisii admit that they carried out deforestation (PO, MK, and PM). However, other farmers are quick to say that they started off from empty fields (DK). Overall, reforestation is happening and some farmers have already invested in young trees (JS, JO, MG, and AM). Coffee is cultivated as an annual monoculture that takes 2 to 3 years to grow. Crop rotation is therefore not feasible.

6.2.2 Air quality

"The emission of air pollutants is prevented and ozone depleting substances are eliminated", (FAO, 2013).

Air quality of JO and MG were likely to be affected by bitumen roads with varying degrees of traffic intensity. The reduction of air pollutant emissions was done by using pruned leaves and branches as compost (PWJ, MK, and AM). However, some farmers used pruned and infected stems as firewood. The burning of infected stems would contribute to air emissions but is beneficial in controlling the spread of diseases. Contribution to pollutants such as sulphur dioxide, particulate matter, volatile organic compounds and carbon dioxide present in fossil fuels occurred during the transportation of coffee to factories and millers. MG had a lorry that delivered inputs from an unknown location and AM delivered coffee from the farm using her lorry. The contribution of air emissions was higher in Nyeri than in Kisii because farmers there had to travel longer distances to deliver coffee whereas sampled farmers in Kisii would at worst use motorcycles (ZH, JS, MK). Farmers in Nyeri have adopted practices that help them reduce the number of trips by delivering dry coffee in large batches which may require pooling of coffee from different farmers (DX). Sun drying employed in Kisii and Nyeri also helped reduce energy requirements and consequently reduced air emissions. The use of synthetic fertilizers and pesticides would also increase the air quality though this would be externalised to the locations where these products are manufactured.

6.2.3 Water withdrawal

Withdrawal of ground and surface water and/or use does not impair the functioning of natural water cycles and ecosystems and human, plant and animal communities", (FAO, 2013).

Interviewed farmers carried out rain-fed agriculture and did not rely on the extraction of surface or underground water for irrigation. MG used to irrigate farm but is now only relying on rain. The use of water increases at the processing level whereby grading is carried out by water (PM). Most farmers supplied their coffee to the factory as cherry (PO, TK, and PO). Water consumption at the factories may therefore be very high especially if the factories are preparing parchment coffee. The pulping units also use a lot of water (AM and MG). There were farms that

had subsidized water connected to their farms which was used for other farm operations (AM, MG, and PWJ).

6.2.4 Water quality

"The release of water pollutants is prevented and water quality is restored", (FAO, 2013).

Water quality was likely to be affected by surface run-off from the farms. Inorganic fertilizer such as DAP and NPK were used (MG and DK). Some farms avoided the use of synthetic fertilizers because of limiting costs and were reliant on organic and compost manure (PO and PM). Some pesticides such as Glyphosate, Rophosate and Marathon as well as unidentified pesticides used in Kisii that were used in the farms could also end up in underground and surface water (TK and DX). Some practices such as consulting extension officers or getting advice on suitable pesticides would probably result in the recommendation for safer chemicals (AM and PWJ). However, this may not be true because AM consults extension officers but still says she has to go away when pesticides are being applied because they are toxic. Physical methods of weed control would also reduce the contamination of water by chemical pollutants but would increase sedimentation (NO and JS). AM and MG did not have stagnation ponds to deal with effluent from their pulping unit. Effluent was released into their farms. PM pointed out that their factory directly discharged effluent from their pulping unit into the river without any treatment.

Figure 6-2: Waste water discharge from pulping unit (Photo by author)

6.2.5 Soil quality

"Soil characteristics provide the best conditions for plant growth and soil health, while chemical and biological soil contamination is prevented", (FAO, 2013).

Organic manure was used to improve the soil (PWJ, TK, MG, DK, PO, and MK). Planting different crops like "mikima" that provide compost (AM) and nitrate fixing ones like "kariandira" also helped to improve the soil quality. Soil structure was maintained through limited tillage (DX, PWJ). Some farms used synthetic fertilizer like CAN, NPK and DAP which could increase soil acidity (AM, MM, JO, and MG). However, MG added lime to correct acidity whenever it was necessary. Factors that contribute to soil quality relate availability of time and money. For example, limited tillage by DX was occasioned by his absence from the farm because of academic engagements. Low use of fertilizer was caused by failure of some CSs to provide fertilizer and lack of money to purchase from agro chemists. Therefore, the performance of this indicator may be affected by improved sales and better functioning CSs. The importance of proper identification of system boundaries was evidenced by two examples whereby farmers that had different produce e.g. coffee and tea applied different treatment for each. In these examples, soil quality was different for each produce within the same physical boundary (respondents farms) i.e. chemical fertilizer for tea and organic manure for coffee. A broader approach of asking questions that take into account the full sphere of influence of the farmer would therefore be desirable.

Figure 6-3: Cow dung to be used as manure for coffee (Photo by author)

6.2.6 Land degradation & desertification

"No land is lost through soil degradation and desertification and degraded land is rehabilitated", (FAO, 2013).

AM carried out a soil test once and realized its importance. She now plans to carry out soil tests each year and follow recommendations from experts on how to improve her soil. Identified land conservation and rehabilitation practices include limited tillage and compaction of land (PWJ, TK and DX). However, for DX limited tillage is mostly because he is not around and the father is too old to do the work himself. PWJ and DX have left some land fallow and have planted grass to prevent soil erosion in these areas. The potential for land degradation is increased where there are cases of subdivision of land. For example, DX's father has subdivided 9 acres of land between 7 brothers. DX plans to construct buildings on his land and has no intention to conserve it.

Figure 6-4: Newly constructed residential units next to coffee farm (Photo by author)

Some respondents responded that their farms were originally empty fields of grass and weeds of limited value (TK, JK, and PZ). It can be argued that there has been a net gain in productive land if these claims are true. Net loss of land is expected for DX who is planning to put up residential units in his allocated plot because he does not expect to make much profit from the 200 trees he will be given. Net gain of productive land is exemplified by AM who has planted indigenous trees ("mikima") which she says is adding a lot of nutrients to her soil. From a total of 21 acres, AM

has planted coffee on 15 acres and the rest has fallow land, residential units for AM and the stuff, the pulping unit and space for drying coffee. Figure 6-5 compares number of trees grown per square metre.

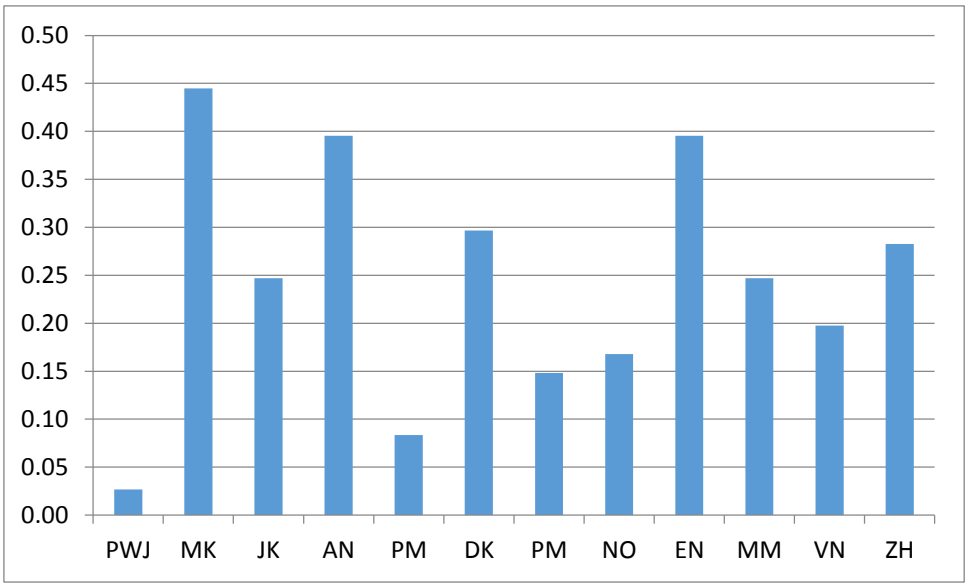


Figure 6-5: Density (coffee trees/m2)

6.2.7 Ecosystem diversity

"The diversity, functional integrity and connectivity of natural, semi-natural and agrifood ecosystems are conserved and improved", (FAO, 2013).

Intercropping of coffee with indigenous trees ("mikima" in Nyeri and "emekabiria" in Kisii) is done (TK, DX, DK, and VN). These trees have been planted as sources of firewood (DK), fruit (TK), shade (AM, MM, JS, JO, DX, TK, ZH, and MK), ant to protect coffee from hailstones (NO) and wind (VN and PZ). However, some farmers do not plant shade trees and leave their farms as annual monocultures because they do not want to risk having declined yields (PWJ). The most diverse farm was found to be TK and AM which was much further away from the main road when compared to other farms visited in Muringato. The adjacent plots were rich in forest cover (Figure 6-6). MG and DX were surrounded by residential units which are likely to increase to provide housing for students and staff from the recently established Dedan Kimathi University. PWJ was mostly a monoculture but neighbouring farms had many trees. Ecosystem

connectivity for JS was the lowest because of a newly constructed bitumen road which divides his farm into two.

Land use and land cover change (LULCC) was acknowledged in some farms (AM, DX, TK, JS, and MM). However, all of these farms were started more than 20 years ago and no recent deforestation was witnessed except for DX. In the case of PWJ, there have been no compensation measures

Figure 6-6: Ecosystem Connectivity (Photos by author)

6.2.8 Species diversity (wild & domesticated)

"The diversity of wild species living in natural and semi-natural ecosystems, as well as the diversity of domesticated species living in agricultural, forestry and fisheries ecosystems is conserved and improved", (FAO, 2013).

The highest amount of species diversity was witnessed in TK who had many varieties of wild and domesticated species such as "cordia abyssinica", "gravaria robusta", "muthandi", custard apple, bananas, mango, "Kariandira", pawpaw, tomato tree. Some farms were estimated to have more than 20% non-utilised plants (PWJ, TK, DX, MG, AM, JS, and MM). In addition, TK and AM had fishponds. The main species conservation practices observed include maintaining fallow land (DX, PWJ, and AM), engaging in apiculture for honey harvesting (AM, DX, JS, and MG) and reduced agrochemical use (AM and MG). Though some farmers kept bees, others viewed them

as being potent to livestock and children and would not consider having them (JO, PO, and PM). Practices that could affect species diversity include monoculture (PWJ), continued LULCC (DX), use of systemic non-selective herbicides such as Glyphosphate[5] (Round up), Rophosate[6] (Figure 6-7), and Marathon (TK and DX). The active ingredient in Marathon is imidacloprid which is harmful to bees and other insect species (OHP, 2006). For some farmers in Kisii, it is not possible to estimate the impacts of pesticides on their farms because they are unaware of the pesticides used (ZH and JO).

Very few farms had a single genetic lineage of coffee one variety of traditional coffee maintained (DX and MG). Almost all farms had a mix of traditional varieties (SL 34, SL 28, K7 and Blue Mountain) or of traditional and locally adapted varieties (Ruiru 11) and almost all had at least one cow. TK maintained locally adapted breed and continuously worked to increase diversity through grafting.

Figure 6-7: Rophosate herbicide used for non-selective weed control (Photo by author)

[5] http://npic.orst.edu/factsheets/glyphotech.html
[6] http://www.coopers.co.ke/our-brands/38/34/Rophosate-360SL

6.2.9 Material use

"Material consumption is minimized and reuse, recycling and recovery rates are maximized", (FAO, 2013).

Material use was mostly kept low because many farmers did not rely on synthetic inputs. The use of compost and manure in place of, or in combination with synthetic inputs helped to reduce material use and dependence on virgin non-renewable materials but exhausted natural reserves. In addition, TK was using a plant called "Kariandira" which he said was good at fixing nitrates in the soil as well as feeding cows. Intensity of material use related specifically to coffee is not likely to have significantly changed because production methods had remained largely similar. However, this would decrease or increase depending on the growth or downsizing of farms. Increased morale and better prices could also increase intensity of material use. For example, AM had lost morale and slowed down production in the last 5 years because of theft of some parts of her pulping machine and low prices which would be reflected as a decrease in intensity of material use though there is no change in efficiency or effectiveness of material use. This is possibly going to change in the coming years with ongoing measures that AM is putting get back in business.

6.2.10 Energy supply

"Overall energy consumption is minimized and use of sustainable renewable energy is maximized", (FAO, 2013).

Energy requirements are low at the smallholder level and particularly in Nyeri and Kisii which are rich in rainfall and sunshine. These two factors reduce the energy requirements for pumping water because farmers do not irrigate their crops and use solar energy to dry coffee. Where energy is required such as for the pulping unit, demand is reduced by using gravity to run water from elevated tanks (AM and MG). In addition, AM and MG only operate their pulping units for short durations within December to process their own coffee. At the CSs water is used to grade and the sun is also used to dry (JM). Energy used for the production of inputs used at the farm like fertilizer has not been considered.

6.2.11 Waste reduction & disposal

"Waste generation is prevented and is disposed of in a way that does not threaten the health of humans and ecosystems and food loss/waste is minimized", (FAO, 2013).

Waste generated at the farm such as pruned branches, and leaves were not collected but used as compost (MG, PWJ, EN, AM, and PO). In addition, PO used organic waste to make manure by mixing with ashes, soil and cow dung. However, pest infested and disease infected cherry and trees in these farms were not properly disposed of which could lead to spread of diseases and pests and carry over to the next year. EN used infected stems as firewood. Food loss was avoided by picking each and every ripe, non-infected cherry even though they had fallen on the ground (PWJ, TK, DX, MG and AM). These were dried or mixed with other produce which may reduce the quality of coffee especially if the fallen crop is infested with pests.

6.3 Economic

6.3.1 Internal investment

"In a continuous, foresighted manner, the enterprise invests into enhancing its sustainability performance", (FAO, 2013).

PWJ farm monitors its income and expenditure but has not carried out any investment to improve its sustainability performance or improve the business in general and therefore, the business has remained relatively similar since 1978.

TK has continuous monitoring in place and is actively involved in monitoring farm on a daily basis to see how it is progressing. DX actively checks his coffee to see whether they are infested with pests and invests in the application of pesticides to control their spread. MG's proprietor, TK and AM have invested resources to check soil performance and also to see whether their businesses are performing profitably. This is in contrast with some farmers who are not carrying out any investment because their CSs are not doing anything to help them.

6.3.2 Community investment

"Through its investments, the enterprise contributes to sustainable development of a community", (FAO, 2013).

TK has invested time and energy to train other farmers and share his knowledge on grafting. AM, MG and PWG have supported the community by training casual labourers who have worked in their farms. PWJ supports other community projects through participation in fundraising activities. AM's investment in a coffee nursery has benefited start-up farms like PWJ in 1978 by offering affordable seedlings.

6.3.3 Long ranging investment

"Investments into production facilities, resources, market infrastructure, shares and acquisitions aim at long-term sustainability rather than maximum short term profit", (FAO, 2013).

JS is slowly investing in the roll out of Ruiru 11 on his farm which he is carrying out in phases that involve cutting down old varieties. In the short term, this is not profitable because the farm loses yield. However, the farmer is aware of long-term benefits. Other farmers such as ZH are unwilling to cut old varieties because of the short term losses.

Animal husbandry such as keeping cows alongside coffee farmers is also seen as a long-ranging investment. Farmers that had cows said that they used cow dung as manure (MK, MM, EN, AM, MG, and PWJ). This was especially useful for some respondents in Kisii who no longer had fertilizer supplied.

TK continually invests in his farm to ensure that he always has coffee to sell even when the market is unfavourable. This is because the farm is aware that the coffee market is volatile and wants to be prepared to supply when the prices are good. TK spends a lot of time and effort to carry out research on how to continually improve his coffee and farm in general. His main research is currently on grafting Ruiru 11 on SL 28 and SL 34. This promises high yields and reduced agrochemicals that are needed during the cold season (AM and TK).

DK and DX point out that "*everyone gets the same price. Only quantity matters*". Consequently, these farms do not make any effort to improve quality of their produce and are only concerned with increasing quantity. AM points out that traditional varieties like SL28 and SL34 do not produce as much as Ruiru 11 but produce higher quality and grades of coffee when compared to Ruiru 11.

MG and AM have invested in means of transport for their produce. This ensures timely delivery of their coffee. It also provides an alternative source of income for AG who rents her lorry to other farmers. AM and MG have also invested in pulping units which has allowed them to get better prices from their produce. Investment in buying lorry and maintaining it which ensures timely and affordable delivery of her produce and diversification of income streams.

Some farmers have invested in apiculture. AM has bought 10 modern beehives and machines for harvesting honey (Figure 6-8). The ability to invest is limited for most of the interviewed farmers in Kisii who claim that income from coffee is too low to make any long ranging investment (PO and PM). Plans to buy beehives have been hampered by lack of funds for VN. Money is used to buy food for house and to educate the children (NO).

Figure 6-8: Apiculture and horticulture in coffee farm (Photo by author)

6.3.4 Profitability

"Through its investments and business activities, the enterprise has the capacity to generate a positive net income", (FAO, 2013).

High production costs and intensive amount of work required reduced profit margins for farmers. Labour and transport were particularly high costs in Nyeri (MG, AM, and PWJ). On average casual workers were paid Kshs. 70 to 200/day and worked for 2 days per week during the coffee season. Varying prices of inputs were also noted. For example some farmers said they paid Kshs. 2,100/50 Kg (DK, MM) for fertilizer and other Kshs. 40,000/50kg (MK and JK). This difference would however be as a result of different types of fertilizer applied e.g. NPK or DAP.

Staggered and delayed payments also affected profitability. This is because farmers were only paid depending on successful sale of coffee at the NCE which would fluctuate depending on the prevailing market rate. Table 6-1 shows the impact of staggered payments on profit when comparing the sale of 1000 kilos of coffee sold at the NCE at different market prices.

Table 6-1: Effect of staggered payments on profit

Sale	Kilos	Prevailing market rate (Kshs)	Net Income (Kshs.)
1st sale	600	24	14,400
2nd sale	200	10	6,000
3rd sale	200	16	9,600
	1,000		**30,000**

Some farmers have been led to believe that this would be equivalent to earning Kshs. 50/kilo (JO and JK) which shows that they are unable to determine whether they are making profits or not.

"It is the same if we are paid Kshs. 50 in one go or in instalments", JK

The coffee market at the NCE invites only registered dealers and marketers to trade. Farmers are represented at the auction by marketers who are at the auction on behalf of millers and CSs (Mbithi, 2014). The participation of smallholder farmers in price determination is limited in this system because dealers offer bids electronically and the highest bidder wins the lot. A dealer at

the NCE, describes the market as being faceless and says that he has no contact with farmers(Sickmueller, 2014). Consequently, farmers are not able to negotiate the selling price with buyers because the current market system removes them from this decision making. The enterprise receives what it gets from the CS after deductions have been made with no negotiation in place.

6.3.5 Stability of production

"Production (quantity and quality) is sufficiently resilient to withstand and be adapted to environmental, social and economic shocks", (FAO, 2013).

Smallholder farmers are unable to sufficiently withstand and adapt to environmental, social and economic shocks because of internal and external factors. Some of the respondents have cultivated old varieties of coffee like Blue Mountain, K7, SL28, and SL34 (PO). These varieties produce little and are susceptible to pests and diseases. However, SL28 and SL34 produce high quality coffee (AM). For smallholder farmers, the focus is mostly on quantity because they are paid per kilo of delivered produce. Those who want to make more money while compromising on quality have been quick to adapt Ruiru 11 which offers high yields as well as increased disease and pest resistance. Figure 6-9 shows the amount of coffee in kilos produced per tree

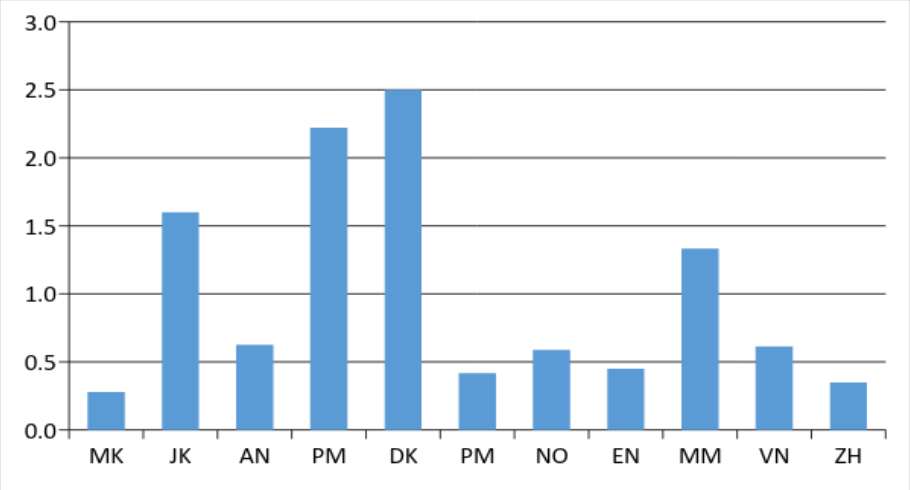


Figure 6-9: Yield (Kgs/tree)

Cultural practices also have a role to play in quantity and quality at the farm level. Some farmers believe that coffee cultivation is easy and that all that is required is tilling and harvesting (MK). PO and DX offer a contrary opinion by stating that coffee production is labour intensive. However, providing adequate conditions for the coffee such as providing trees for shade or as windbreakers (VN, AM, and TK).

The quantity of coffee generated from a farm is not always determined by the amount of inputs provided. The availability of labour is seen to be important. A farm may therefore, have indicators showing decreasing yield whereas coffee is left hanging on the trees. Factors that can affect labour include the availability of jobs that pay more for less effort e.g. motorbike taxis (MK). Since coffee is picked at the same time, there may also be of people available to pick (PWJ, MG, and DX) However, this is not to say that inputs are not important. Figure 6-10 the average annual harvested coffee. MM was seen to produce the most coffee per annum. This could be attributed to her access to key inputs such as fertilizer, pesticides and seedlings.

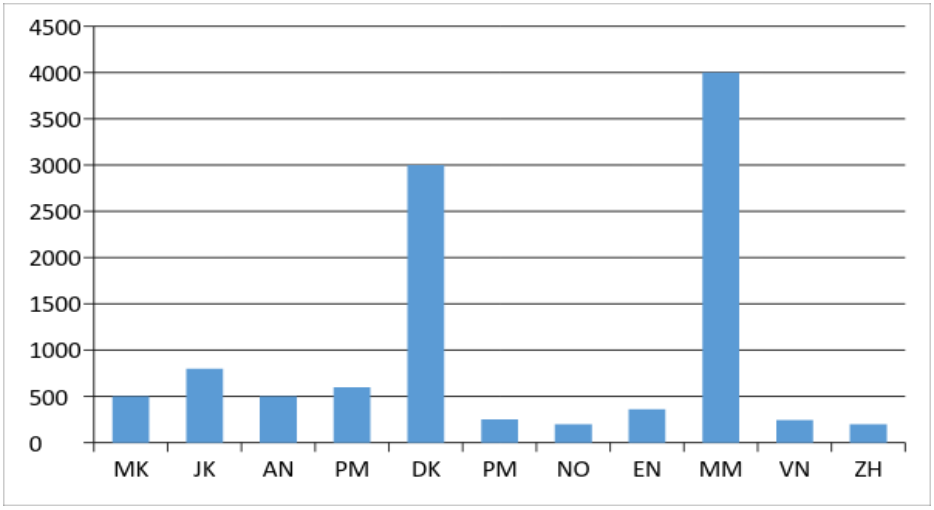


Figure 6-10: Average annual amount of harvested coffee (Kgs)

The failure of certain agrochemicals being supplied to some respondents has had adverse effects on the quality and quantity of their coffee (NO). Low morale occasioned by low payments has pushed some farmers to uproot their coffee and in its place are putting maize and Napier grass

(PM). Those that have not uprooted are intercropping their coffee with maize. Others simply desert their farms or maintain their coffee bushes as heritage.

Product diversification is also an important consideration for stability of production in coffee. Diversification can occur within (different varieties of coffee) the same product or between products. TK has identified that SL28 and SL34 are better adapted for long-dry periods whereas Ruiru11 is susceptible because it has a comparatively shorter root span (Figure 6-11). On the other hand, Ruiru is better adapted to pests, diseases and cold weather. By having a diversity of coffee varieties reduces the exposure to risk to weather changes. For example, by investing in cows for dairy farming, PWJ has been able to make savings that can help her to pay for labour costs. Cows also provide manure which decreases reliance on synthetic fertilizers.

Figure 6-11: Grafting of Ruiru 11 on SL 28 at TK farm (Photo by author)

6.3.6 Stability of supply

"Stable business relationships are maintained with a sufficient number of input suppliers and alternative procurement channels are accessible", (FAO, 2013).

The relationship between smallholder farmers and the main suppliers was found to be stable when stability is considered to be the quality or state of something that is not easily changed or likely to change. Farmers were found to be bound by their CSs and had little choice when it came to switching to other CSs. The key criteria that determined the CS that farmers chose was

proximity. This is an important consideration for coffee which requires to be processed very fast. Dependence on the CS as the main supplier was seen to be more in Kisii in Nyeri. Farmers in Kisii almost fully relied on their CSs for the provision of fertilizer, pesticides, herbicides and extension services. Consequently, the failure of CSs to provide these key inputs to farmers has resulted in decreasing yield and significant losses attributed to pests and diseases. These farmers have not sought alternative procurement channels even though some have not received any inputs for the last 4 years. DK, NO and EN attribute this inaction to the fact that they do not have money to afford these inputs and still put food on the table. Different treatment exists within the same CSs. For example, MM belongs to Nyaigwa CS and says she receives pesticides and fertilizers whereas DK, ZH, AN, NO, VN and EN who belong to the same CS say they have not received inputs. The same is seen in Murumba CS (and its branch Gesoko), MK says she has been receiving pesticides, training, and fertilizer though PM says he does not. Further research could look at whether a correlation exists between the sizes or influence of farmers to accessibility of inputs.

Farmers in Nyeri seem to be less reliant on their CSs. AM for example has only joined a CS just for information purposes. TK has done a cost benefit analysis and concluded that inputs from the CS are more costly and identified alternative suppliers such as agrochemists. Farmers have also adopted strategies to cope with high cost or shortage of inputs. In Nyeri, where labour is scarce, farmers have to come up with attractive payment packages to lure casual workers to their farms (AG, PWJ, and DX). In Kisii, PO has switched to organic manure which he prepares himself by mixing cow dung, leaves, ash and soil.

6.3.7 Stability of market

"Stable business relationships are maintained with a sufficient number of buyers, income structure is diversified and alternative marketing channels are accessible", (FAO, 2013).

The structure of the coffee market in Kenya is designed in a way that smallholder farmers are obliged to go through CSs which then source for markets for them through millers and

marketers. Since most of the coffee is sold through the NCE farmers have little choice with regards to sourcing alternative markets. Local consumption of coffee is also low and is therefore an unattractive market. As a result, the diversity of income structure in relation to coffee is low though opportunities like making biomass briquettes using waste from the pulping units which is currently discharged into rivers (PO). Larger farms like AM and MG which have their own pulping units are able to negotiate with millers to identify alternative marketing channels. For example, AM has entered into a written agreement with Sasini who mills and markets coffee which can either be sold at the Nairobi Coffee Exchange, abroad, or consumed locally.

6.3.8 Liquidity

"Financial liquidity, access to credits and insurance (formal and informal) against economic, environmental and social risk enable the enterprise to withstand shortfalls in payment", (FAO, 2013).

Smallholder farmers are exposed to significant environmental, economic and social risks. Coffee remains the property of the farmer until it is sold at the market(Macharia, 2014; Mbithi, 2014). Millers and Marketers are obliged by law (Coffee Act 2001) to be insured but farmers and CSs are not. Losses that occur at the CS, for example through theft, are at the farmers cost. Money is only paid to farmers after coffee has been sold which can "come at any time" DK. Another farmer says that it can take 2 or 5 months. Interviewed farmers pointed long waiting times and the number of payments as a major concern (ZH, VN, and DK). Since coffee is mostly supplied in cherry form and no reports are given to farmers, it is not evident for farmers to know the grade of coffee they produce, date of sale or the batch number. This gives room for CSs to delay payments. Nyaigwa CS is accused of holding onto farmers' money for private benefit. PM states that money is immediately disbursed whenever they complaints from farmers start to mount. These delays and unpredictability of payments make it difficult for farmers to purchase key inputs, work or to plan (VN, DK and PM).

"We were last paid in March and I do not know when the next payment will be" ZH

"The employees that work at the factory get a salary each month but the farmer does not get anything. The employees get monthly benefits while the farmer gets nothing" NO

In addition to frequency of payments, farmers are also unable to determine how much they are going to be paid and there is no guarantee that they will recover costs incurred. This is because the price at the market depends not on the production costs of the farmer but on the prevailing global market rate in New York and demand for coffee at a particular market date. Money is paid in batches depending on the success rate of selling at the market. The difficulties faced by farmers are expressed by PO as follows:

"…you work the whole year without money, then the next year comes and you are paid three times and you pay debts and are left with nothing" PO

Farmers are not provided with cash advances by their CSs. Inability to predict income also makes them unattractive for loans. Those that could probably apply for loans are afraid of interest rates and banks in general (PO, ZH). MK has however, taken a loan of Kshs. 15,000 from Murumba CS and states that to take a loan one must have shares at the CS. Farmers therefore depend on family and friends to be able to purchase key inputs and pay casual labourers (JS). Other farmers are able to use savings (PWJ and AM) and income from other sources such as dairy farming (PWJ) or horticulture (MG) to advance money to their coffee business. In Kisii, some farmers come together and help each other to pick coffee and other cultural practices in rotation (PO).

6.3.9 Risk management

"Strategies are in place to manage and mitigate the internal and external risks that the enterprise could face to withstand their negative impact", (FAO, 2013).

Some farmers adopt risk management strategies aimed at protecting their crop from damage. In Kisii, hailstones and wind are issues of concern which have driven farmers to plant trees as shade and windbreakers to protect their coffee (NO). On the other hand, morning frost is of concern in Nyeri which makes farmers apply agrochemicals against the cold. Others have also adopted Ruiru 11 which is better adapted to the cold (TK and AM). This has had the increased benefit of reducing dependence on agrochemicals against frost, pests and diseases. TK and DX actively

check their crop to see whether they are infected or infested and apply corrective measures (Figure 6-12). JS however, says he does not bother with scouting for pests and diseases because there is nothing he can do about it. To cope with economic risks and inability to feed their families, some farmers are intercropping maize and beans with their coffee which increases competition for nutrients (AN, and JK). Contacting extension officers or representatives from CSs is done by PWJ and AM whenever they identify problems. This helps them to implement timely and appropriate timely action to prevent and mitigate risk.

Figure 6-12: Scouting for pests at TK Farm at DX farm (Photo by author)

6.3.10 Food safety

"Food hazards are systematically controlled and any contamination of food with potentially harmful substances is avoided", (FAO, 2013).

The main factors that could potentially cause food hazards at the cultivation and initial stages of processing were identified in literature as being related to storage and drying. Farmers preferred to deliver their coffee in cherry form but whenever this was not possible they dried their coffee while waiting for the next call for coffee from their CSs. This may explain the reason why some farmers did not invest in drying racks or separate storage for their coffee. However, farmers like MG and AM invested in high capacity drying racks and AM also had a shade to protect the coffee from rain and direct exposure. TK did not have a dedicated store for drying coffee and stored herbicides, equipment and other tools in the same store. JS dried and stored coffee inside the house.

The use of herbicides such as *Roundup, Marathon* and *Rophosate* could result in traces of these products in the food which may affect health.

6.3.11 Food quality

"The quality of food products meets the highest nutritional standards applicable to the respective type of product", (FAO, 2013).

Cutural and post-harvest practices such as pest control, disease control, pruning, nutrition, picking, drying, cleaning and storage are the main steps carried out by smallholder farmers that could affect coffee quality (Appendix B & D respectively). Due to limited funds and unstable supply of inputs, farmers have been unable to adequately nourish their coffee. Poor disease and pest management as seen in Kisii (JO, DK) has affected the quality of coffee delivered to the markets (Macharia, 2014). Lack of dedicated stores (JS) is likely to increase risk of mould formation (Fig. 6-13).

Figure 6-13: Sacks of dried coffee in a store (Photo by author)

However, some farmers have employed measures to improve coffee quality. For example, MG applies adequate nutrition during the flowering stage to ensure that the coffee does well. The farm also does washing and cleaning during pulping and ensures that fermentation does not exceed 72 hours. Delayed harvest of coffee is also a factor that could affect the quality of coffee. Some farmers said that they only harvested coffee when told by the CS to do so (DK, ZH). It

was observed that there was no incentive to invest in producing good quality because income only depended on weight. Some farmers like TK are aware of this but would still like to produce good coffee:

> *"…I want to produce more and make more money. I would like to produce the best coffee, the best quality, and a lot of it" TK*

6.3.12 Product information

"Products bear complete information that is correct, by no means misleading and accessible for consumers and all members of the food chain", (FAO, 2013).

Owing to the nature of the market which excludes smallholder farmers from directly marketing their coffee, none of the farmers directly made any claim that would mislead consumers. Such information would be provided by marketers on behalf of CSs. However, there were no mechanisms observed or mentioned that showed that the CSs were collecting relevant information that could be used to inform consumers. Product information would be available to some extent where farmers relied on inputs from CSs. For example, in Kisii the majority of farmers said that they fully relied on their CSs for fertilizers and the CSs were also responsible for spraying pesticides and herbicides in their farms. However, farmers could still procure potentially harmful agrochemicals from other sources. This information would not be available to the CSs because farmers are not required to provide any information related to production methods or inputs back to their CSs. In Nyeri, farmers like TK, AM, DX and PWJ procured agrochemicals and did not inform their CSs on what they used. Because this information was not required, farmers like PWJ and TK were not concerned with keeping records relating to agrochemicals used and were more concerned with their prices.

The inability to trace coffee back to specific farms also complicates the availability of complete information. A dealer at the NCE mentioned that they were only able to trace coffee back to the CS(Sickmueller, 2014). Only registered members with unique identifier numbers are allowed to deliver coffee to CSs (PM, PWJ, MK, and PO). This would allow traceability to specific farmers.

However, since farmers mostly deliver their coffee in small batches of cherry which is mixed on arrival after weighing, it is improbable that CSs are able to trace coffee back to specific farmers. In addition, it would also not be possible to obtain complete information in specific cases where coffee from different farmers is delivered under a unique number. For example, DX provided a unique case whereby within the same farm, siblings applied different farming methods and agrochemicals which were then pooled together for delivery. PM also mentioned that there were individuals who were registered at the CSs but had no coffee farms. These individuals would buy coffee from farmers and deliver to CSs. In addition, farmers were also not provided information about their coffee after they delivered their coffee. The only information they received was related to the weight of the kilo. They did not know the grade or quality of their coffee (JS). This shows that the CSs were failing to convey information to marketers and farmers. None of the farmers interviewed were in any certification scheme.

6.3.13 Value creation

"Enterprises benefit local economies through employment and through payment of local taxes", (FAO, 2013).

The sampled farmers benefitted their local communities by providing seasonal work especially during pruning and picking. In Kisii, casual workers were mostly from the villages. However, due to labour shortage, farmers in Nyeri had to look beyond their villages to look for workers especially during the picking season (MG, PWJ, and AM). Farmers that were sampled in Kisii said that they were not paying any taxes and that deductions for taxes were done by the CSs (NO). However, AM said she has to take note of all her income and expenditure to pay taxes. This is probably because she has a business license to operate a pulping unit.

6.3.14 Local procurement

"Enterprises substantially benefit local economies through procurement from local suppliers", (FAO, 2013).

Farmers in Kisii relied on the supply of key inputs from their CSs and had no financial means to purchase coffee from other local suppliers. The situation was different in Nyeri because farmers preferred to buy from agrochemists who were said to be cheaper (PWJ, TK, and AM). It is not

clear where MG sources inputs from because the proprietor of her farm remotely procured and had inputs delivered.

6.4 Social

6.4.1 Quality of life

"All producers and employees in enterprises of all scales enjoy a livelihood that provides a culturally appropriate and nutritionally adequate diet and allows time for family, rest and culture", (FAO, 2013).

Figure 6-14: Housing for TK (Photo by author)

It was observed that some of the respondents lived in decent, well-furnished stone houses with access to electricity and piped water (PWJ, AM, TK, and MM). TK upgraded from a timber structure to a well-built permanent house (Fig 6-14). These farmers were however, not fully dependent on coffee. In addition AM and MG had invested in providing housing to permanent workers and their families on the farm. One of the farmers said that coffee was enough to sustain her family but that this depended on the quality of the coffee (AM). Proceeds from some farms had been invested in machinery, equipment, and diversification into transport services (AM). PWJ had also dairy farming from coffee proceeds. Other farmers lived in mud houses but were comfortable and had access to electricity and piped water (PM) while others were unhappy with their living conditions (PO, DX).

> *"I have been a coffee farmer for 20 years and I live in a grass thatched roof. I cannot even afford to buy iron sheets" DK*

It was pointed out that it was not possible to sustain a family only from the income from coffee (EN, MK, PO, JK, DK, JO, and ZH). It was observed that many farmers considered coffee to be not profitable because of their inability to be able to provide food or education to children from sales.

> *"Our children are suffering. Hunger is killing us at home. Do they want our children to become thieves?" NO*

In Kisii, farmers imposed strain on their bodies by delivering of produce to the factory on their heads or shoulders (AN, VN, NO, and PZ). In addition, farmers were driven to carrying out any casual work within the village that was available such as breaking firewood, fetching water, tilling maize, and masonry (EN, NO, and PM). They stated that this had an impact on their bodies. It was also stated that lack of machines forced the farmers to put in long working hours since everything was done manually (DX and PO). However, the farmers did not specify what machines they would need to reduce drudgery.

6.4.2 Capacity development

"Through training and education, all primary producers and personnel have opportunities to acquire the skills and knowledge necessary to undertake current and future tasks required by the enterprise, as well as the resources to provide for further training and education for themselves and members of their families", (FAO, 2013).

It was observed that farmers had limited or no formal education. For example, some farmers had not been to school (AN and PZ) or only attained primary education (JK, DK and JS). ZH stopped school in second last year of secondary school after she got pregnant. PM pointed out that this lack of education exposed them to abuse (PM). DX identifies that most farmers are illiterate and are not knowledgeable. This, he says, has affected their participation in governance and their adoption of new and profitable agribusiness strategies. There was also limited vocational training or support from CS or extension officers (MM, JO, JK, VN, PZ, and ZH). PO attributes this to increased number of farmers in the region and limited resources.

> *"There is no one to direct farmers to where the truth is" PM*

However, other farmers benefitted from training and seminars (JK, TK, AM, PWJ, PO, and JS) carried out by Ruiru research Centre, Farmer field schools, Kisii Planters Union, and Wambugu Farmers School.

Some farmers actively transferred knowledge to the children and the community (JK and DX). Potential for knowledge transfer from educated children.to older parents on modern agriculture was unexploited (DX and PWJ)

Lack of education and training has resulted in a lack of knowledge on coffee, the coffee market, availability of resources, pests and diseases, biodiversity and ecosystem services. For example the majority of farmers could not identify diseases or pests. In Kisii some farmers thought that their coffee was affected by the same weevils that attack maize. Others did not know where to find key inputs like fertilizer or pesticides (JS). No farmer showed any understanding about how the coffee market was structured or activities beyond their CSs. The contribution of shade trees to protect coffee was generally known. However, other ecosystem services of benefit to their coffee such as those offered by bees were unknown. For example, bees were only seen to be useful for honey production (PO and MK).

6.4.3 Fair access to means of production

"Primary producers have access to the means of production, including equipment, capital and knowledge", (FAO, 2013).

It was observed that farmers had no access to information and knowledge. PM and DX said that CSs did not want people to have the capacity to fully understand how the coffee market works. For example, farmers were not allowed to visit their factories or to go to NCE. They only allow organized visits to factories and milling plants at their convenience (DX). Information about sale of his coffee is not provided to him by CS (TK, PWJ, NO, and PM). Some farmers complained that they had no access to extension officers. Double standards were observed because some farms within the same CSs had no visits whereas others had. None of the large sized farms for

example, complained of lack of access to extension officers or to agricultural inputs like fertilizer or pesticides. Some small farmers also benefitted from these services and it was not apparent what criteria the CSs used in selecting farms.

Consequently farmers have no access to key inputs and (PK and DK). For example, DK, EN, AN and NO complained that they had not received pesticides in 4 years. Legal barriers were also seen to impede access to key inputs. For example, TK stated that the "Laws of Kenya do not allow me to have a machine". Lack of machines to help them in grading stated as a problem that makes them lose money to brokers & middle-men. (TK, PWJ). Larger farms like AM had access to equipment and machinery.

6.4.4 Rights of suppliers

"The enterprises negotiating a fair price explicitly recognize and support in good faith suppliers' rights to freedom of association and collective bargaining for all contracts and agreements", (FAO, 2013).

Smallholder farmers are at the bottom section of value chain with regards to power. Some suppliers of key inputs have more control over smallholder farmers. This can be seen where the CSs procure and supply inputs without farmers consent and deducting costs incurred to them. For example, Nyaigwa CS gave wheelbarrows and gumboots to farmers and deducted this from their payments. CSs also supply fertilizer and pesticides at higher than market prices. Their interest rates are also said to be not transparent as payments are deducted from coffee sales (PO). In addition, farmers are aware of neither the type, quantity nor the costs of the pesticides (JO, PO). Larger farms like AM, MG, and PWJ have the capacity to negotiate with suppliers and on equal (or almost equal) terms. Other key suppliers are casual workers who provide labour needed for cultural practices and harvesting. DX recognizes importance of paying workers well. However, none of the respondents that responded to the question on how much they paid their workers showed that they met minimum wage requirements set by the government.

6.4.5 Employment relations

"Enterprises maintain legally-binding transparent contracts with all employees that are accessible and cover the terms of work and employment is compliant with national laws on labour and social security", (FAO, 2013).

Long term relationships: MG did not verify whether she has a verbal or written contract. Seasonal workers have no written contracts but have worked for over 10 years at the farm and feels at home at the farm. Written contracts are not common because Workers are employed based on mutual understanding and mutual trust (PWJ, TK, and AM). However, AM issues payslips to workers when they get paid?

6.4.6 Forced labour

"The enterprise accepts no forced, bonded or involuntary labour, neither in its own operations nor those of business partners.

Cases of forced labour were not explicit. However, an analysis of factors such as low wages of Kshs. 80 – 100 for 6 to 7 hours of work point to desperation or shortage of employment opportunities that can lead workers to take up jobs that may be harmful to them. One extreme case showed a farmer that forced an under-age child to work in exchange for food.

6.4.7 Child labour

"The enterprise accepts no child labour that has a potential to harm the physical or mental health or hinder neither the education of minors nor its own operations or those of business partners", (FAO, 2013).

DX responded that child labour depended on perspectives. For DX, it was ok for children to work in the farm as long as they were allowed to go to school. In general, children were seen to be in school and some had even reached tertiary levels of education (PWJ, AM, PM, PO, and MK). The only case of child labour was seen by ZH whose 13 years of age was out of school, and was made to work hard in the farm in exchange for food.

6.4.8 Non discrimination

"A strict equity and non-discrimination policy is pursued towards all stakeholders; non-discrimination and equal opportunities are explicitly mentioned in enterprise hiring policies, employee or personnel policies (whether written or verbal or code of conduct) and adequate means for implementation and evaluation are in place", (FAO, 2013).

With regards to gender MK hired both male and females and paid the same amount of money for work done (MK). Other farms only hired men because they worked more (NO) and others only hired women (DK, AN, VN). AM and PWJ hired people from different regions in Kenya regardless of gender.

6.4.9 Gender equality

"There is no gender disparity concerning hiring, remuneration, access to resources, education and career opportunities", (FAO, 2013).

MM and AM employ both male and females and pays them similar amounts for equivalent tasks. DX mostly contracts women. However, DX finds that Finds that some work is mostly for women – picking, taking to factory and "such stuff" where there are more women than men but still thinks it is OK to have equal opportunities. Unequal opportunities on the basis of gender were witnessed by MK and ZH who are not allowed to inherit paternal land even though they are the ones who take care of the farms.

6.4.10 Support to vulnerable people

"Vulnerable groups, such as young or elderly employees, women, the disabled, minorities and socially disadvantaged are proactively supported", (FAO, 2013).

PWJ provided employment possibilities for one worker because she said that they worked better and had valuable knowledge gained from their experience working from British Settlers. ZH and DK also allowed their old parents to keep working because it helped keep them active. TK provided differentiated tasks like mixing coffee during the drying stage for the 80 year old father (Fig. 6-15).

Figure 6-15: Elderly farmer carrying out differentiated tasks (Photo by author)

6.4.11 Workplace safety & health provisions

"The enterprise ensures that the workplace is safe, has met all appropriate regulations, and caters to the satisfaction of human needs in the provision of sanitary facilities, safe and ergonomic work environment, clean water, healthy food, and clean accommodation (if offered)", (FAO, 2013).

The farms maintained clean and healthy workplace within their financial means. Casual workers used the same pit latrines and access to water as the farm owners. No protective clothing was witnessed and no farm had any training and protocol. Employees were generally responsible for their own health and safety (PWJ and AM). In Nyeri and its environs, there are many hospitals and health centres. However, most farms are not near the road and public transport is not available. AM has a car that she can use to take injured employees to hospital.

6.4.12 Public health

"The enterprise ensures that operations and business activities do not limit the healthy and safe lifestyles of the local community and contributes to community health resources and services", (FAO, 2013).

Most farmers that were interviewed did not have any processing activities on their farms. Waste water was therefore, externalised to the areas where factories were located. Nyaigwa was accused of discharging waste water from its factory directly into the river (PO). For PO, this is not a problem. Potentially harmful chemicals which were identified that could affect public health include Marathon, Roundup and Rosphate (TK and DX). Public health was also put at risk by JS who dried coffee in his house and had no separate storage for coffee. This could lead to mould formation and its associated health risks. Farmers in Kisii (e.g. PO and ZH) who were supplied

with pesticides that they did not know about also put the public health at risk by failing to take responsibility over their produce.

6.4.13 Indigenous knowledge

"Intellectual property rights related to traditional and cultural knowledge are protected and recognized", (FAO, 2013).

TK claims that knowledge generated on his farm is his own knowledge and does not recognise existing work done by others or inputs made by Ruiru Research Centre. Interestingly, PWJ identified indigenous knowledge to be that from the British settlers that left the coffee farms in the region. This information, she added, was held by ex-workers of these settlers who she hired on her farm so that they could pass on the knowledge to the present generation.

6.4.14 Food sovereignty

"The enterprise contributes to, and benefits from, exercising the right to choice and ownership of their production means, specifically in the preservation and use of traditional, heirloom and locally adapted varieties or breeds", (FAO, 2013).

Some enterprises are ensuring food sovereignty by sticking to, and preserving the use of traditional varieties of coffee while adopting locally adopted varieties (AM, TK, and JK)

7 Discussion

The SAFA tool was first used to compare the sustainability performance of 3 of the larger farms (PWJ, AM, MG). The results were presented in a Spider Web shown in (Fig- 7-1)

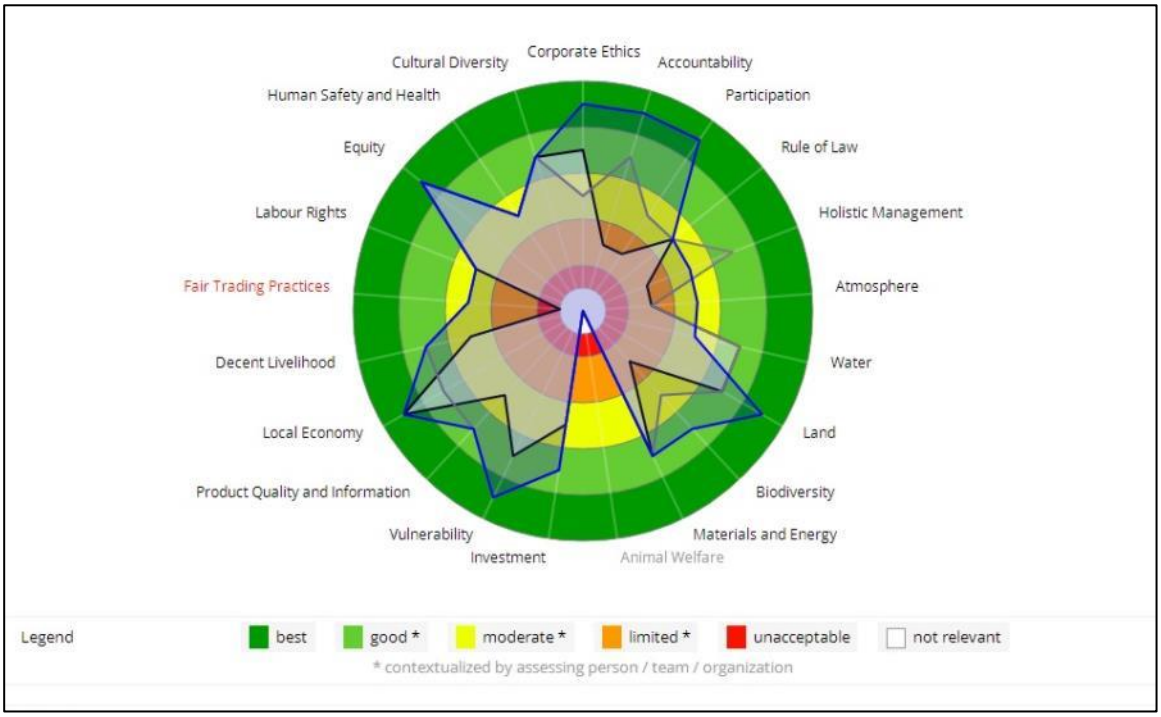


Figure 7-1: Spider Web comparing sustainability performance of PWJ, AM and MG

This demonstrated that SAFA tool could be used to compare the performance of different farms. However, significant differences between and within groups were noted when an analysis of variance was carried out. For example, an analysis of variance comparing all the interviewed farmers with an alpha of 0.05 found that there were significant differences F(4.24)>F-critical (1.79) with a p-value of 4.71309E-06 (Fig. 7-2) for governance.

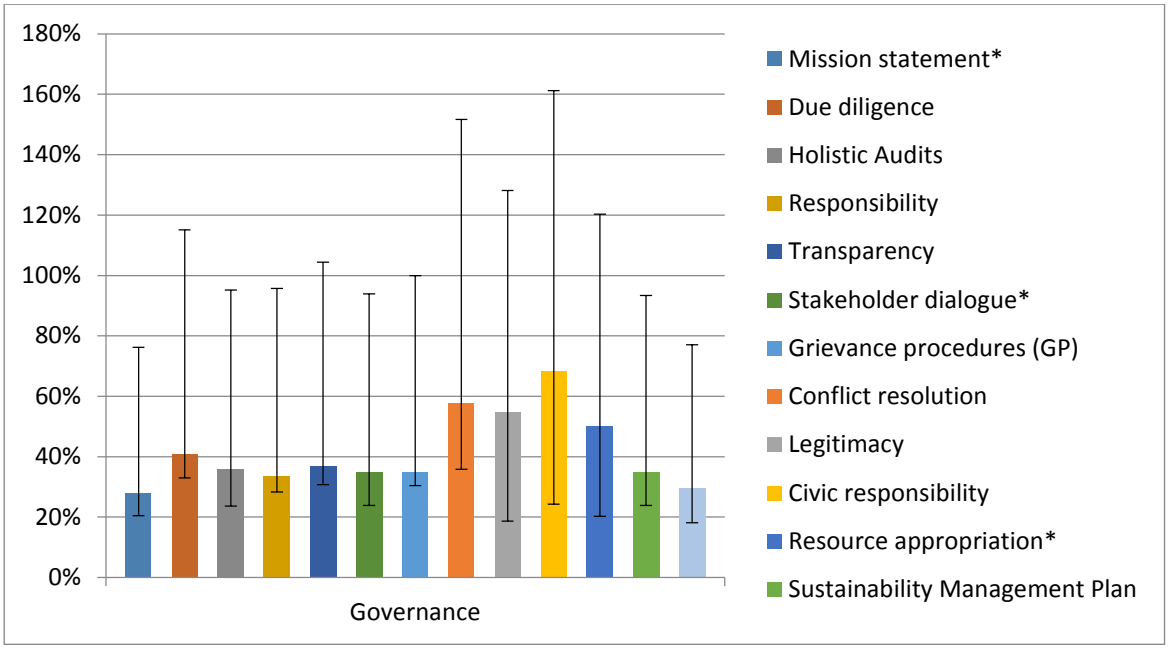


Figure 7-2: Analysis of variance of all respondents for governance

Differences were thought to be caused by the combination of both large and small farms but an analysis excluding the three large farms (PWJ, MG, and AM) yielded even bigger differences (Fig. 7-3): F(36.96)>F-critical (1.84) with a p-value of 1.26E-41 for governance.

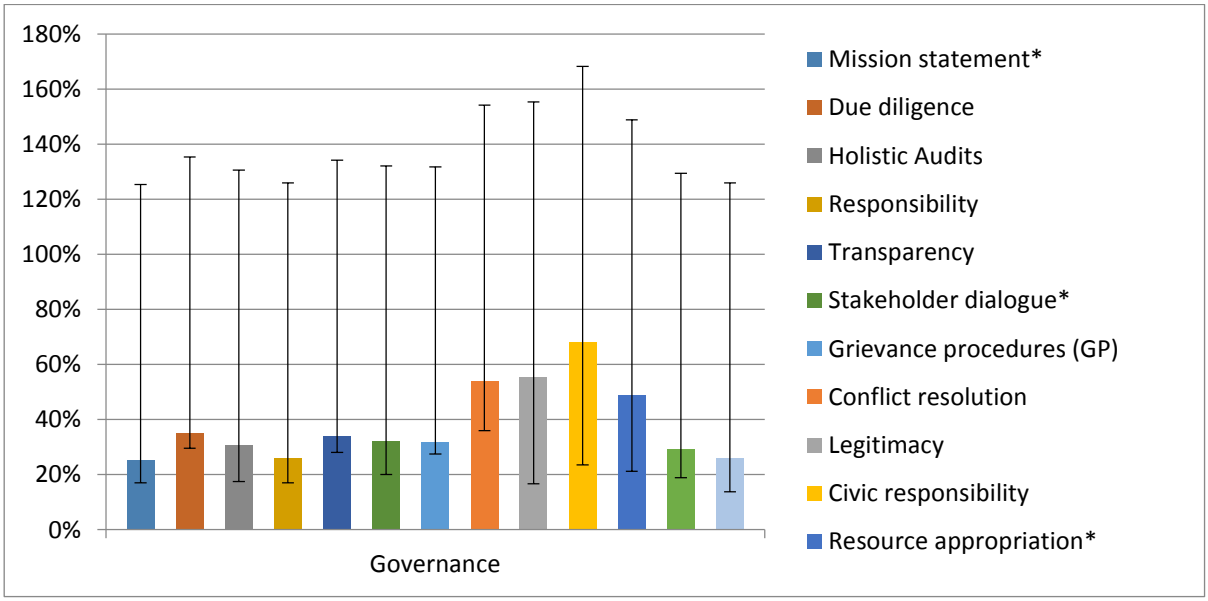


Figure 7-3: Analysis of variance of all respondents for governance

The same pattern was observed in other sustainability dimensions and variations were also seen when comparing groups clustered into CSs. The arithmetic mean however, did not differ significantly. Results did not change when breaking up the groups into small sizes. For examples, farmers in Murumba CS were compared and variation was also considerable. SAFA was therefore, seen to be useful in providing comparative performance of farms based on the arithmetic mean.

Results could have been affected by conscious or unconscious change in behaviour by the respondents (Sapsford & Jupp, 2006). This was noted in cases where follow up questions yielded different results. In addition, the interviews, observations, transcriptions and reporting were done by the author. This may have resulted in the filtering of information based on the author's lens (Sapsford & Jupp, 2006).

The sampling approach selected is also cause for introduction of errors. The sample sizes in the Nyeri and Kisii and were different. In addition the farm sizes, age, cultural differences, education levels, and alternative income sources also differed. The samples selected are seen to be convenience samples based on accessibility of farms and willingness to speak. The choice in sample is likely to have caused a bias in results (Henry, 1990).

Contextual factors also affected results. For example, in Kisii farmers are faced with hailstones and heavy rainfall and were therefore, more driven to plant shade trees. In Nyeri, farmers were affected by cold weather which caused morning frost that affected their crop. As a result, farmers in Nyeri used agrochemicals or planted varieties to deal with their unique challenges. Socio-economic factors and governance also affected results. In Kisii CSs were seen to be mismanaged and selective in offering services.

Cultural factors would influences results also. Some respondents would not accept to put beehives for cultural reasons. Land inheritance in Kisii also differs from that in Nyeri. In Kisii, many respondents worked on family land and women were not allowed to inherit land.

Other observations noted during the analysis of data were that for some specific indicators, farmers got low scores but this was not to mean they were not doing any positive measures. The SAFA Guidelines provided some indicators with "AND" and "OR" exclusion criteria and consequently, positive actions were discounted and vice versa. Positive performance was observed in some indicators. In Kisii for example, environmental performance was good. This is however, attributed to unintended positive benefits gained from mismanaged CSs. For example, corruption and mismanagement is bad for the running of CSs and general welfare of the farmers but as a result of this, farmers had no access pesticides and fertilizers which is arguably good for biodiversity, soil and water quality.

Some indicators were also seen to have double/negating effects. For example, addition of fertilizer is good for quantity and quality of coffee but not necessarily beneficial for the environment. More cows would also translate to more manure which would be good for soil quality. The cows however, increase GHGs and large herds may affect soil quality by trampling.

The time scales were also identified as issues of concern. Some SAFA indicators were pegged on 5 or 20 year time scales. This would therefore, give farmers like PWJ and AM who carried out deforestation in their farms in the 1970s a good score. A major weakness in this research was that actual data records were not checked to confirm statements. For one group in Kisii, 4 farmers were met on site and the author did not visit their farms to confirm their statements. Remote sensing was also not done to verify historical changes in land use patterns to verify claims that some farms were initially not forested.

In addition, some indicators were estimated and some questions were not asked because the semi-structured approach may have focused on emerging issues and drifted from the main thematic assessment framework

In figure 6-10, it was seen that DK had 3000 Kgs translating to 2.5 Kgs/tree. This could be because of good cultural practices or incorrect information by the respondent. The latter is more probable because the farm had suffered from limited inputs. The respondent had provided information pointing to high disease and pest rates and also provided incorrect information for other indicators. This example demonstrates the importance of verification of statements by respondents and some limitations to this research.

8 Conclusions

This study sought to test the hypothesis that a common global standard on sustainability assessment can be a useful starting point for developing more context-specific assessments. This was done by applying SAFA guidelines to carry out an assessment of small holder coffee farmers in Nyeri and Kisii in Kenya. The SAFA guidelines provided a holistic framework that viewed agricultural systems from four dimensions of sustainability, that is, good governance, environmental integrity, economic resilience and social well-being.

The study was guided by three objectives; the first one focused on investigating the main challenges and concerns in coffee cultivation and processing for small holder coffee farmers; the second focused on investigating how SAFA can be adjusted to make it useful in the context of coffee smallholders in Kenya; and finally recommendations on how to apply SAFA to other smallholder farming systems.

The SAFA tool yielded important data on the challenges and concerns of the smallholder coffee farmers. Interview questions to obtain data required by the SAFA framework captured the curiosity of farmers who wondered why some questions were being asked. This led to discussions that identified issues that were hitherto not considered by the farmers. These issues have been presented in the finding session of this research. Some of these issues point to unsustainability in the cultivation and processing of coffee in Nyeri and Kisii. Key concerns include lack of transparency in the running of the coffee market in Kenya, limited engagement of smallholder farmers, lack of safety nets, unavailability of key inputs (knowledge, information, equipment, and agro-chemicals) and lack of awareness of their impacts or positive contributions to the environment and society.

The thematic framework used in this research (Appendix A) could provide a basis for adjusting SAFA for smallholder coffee farmers in Kenya. The methodology adopted in the research could

also be extended to other agricultural products cultivated by smallholder farmers when shortcomings identified in the discussion section of this paper are taken into consideration and mitigated.

This research looked at the SAFA guidelines (version 3.0), SAFA indicators and SAFA analytical tool (beta version 2.1.50) and came up with a number of recommendations on how to improve and apply SAFA to other contexts.

For SAFA guidelines and indicators, the research suggests the deletion of "Freedom of association & right to bargaining" as a sub-theme because this is already covered under "rights of suppliers". Furthermore, the guidelines in the current form places emphasis on corporate best practices which include mission statements and emphasis on written plans. Smallholder farmers with no written plans would therefore, perform poorly even though their actions point to existing but unwritten plans. Consideration should be given to this when assigning scores to farmers. It would also be advisable not to focus on one crop when carrying out an assessment because there may be other crops within the sphere of influence of the farmer with detrimental or positive effects.

The beta version of the SAFA tool was found to be generally user friendly and practical because it could be used offline which was useful for remote areas with limited internet connectivity like some villages in Kisii and Nyeri. The tool also provides a glossary of terms which allows a common understanding. However, considerable amount of time is required to fill in one SAFA because of the extensive list of 108 indicators. The tool was found to be useful for scoping and determination of criteria for assigning scores for indicators. However, if more than one SAFA is to be done it would be useful to have an import function to process data available as text files or spreadsheets. This would allow a CS, for example, to assess farmers by extracting data from its database. It is also tedious to scroll back to the top to move to the next indicator. A feature to

move to the next indicator at the bottom of the form would save time. It was also observed that a user had to close the SAFA tool for each assessment which also took time. In addition, results were presented in a spider web which allowed a maximum of 3 SAFAs to be compared. Uploading more than 3 assessments and toggling display to show 3 results at a time would be a way to overcome this limitation. It was also seen that the visual effect could be changed depending on the base layer. This could lead to manipulation or misinformation.

In general the SAFA tool was found to be very useful in comparing results and identifying hot spot areas. The variances identified in the discussion section would require further research to determine, for example, whether SAFA is better suited for comparing the performance of individual farms over time.

In conclusion, the SAFA guidelines, indicators and tool successfully identified key issues that need to be addressed to improve the welfare and business performance of smallholder coffee farmers in Kisii and Nyeri Counties. This was done by adopting the guidelines to meet the specific needs of coffee farmers by modifying terminologies aimed at large and mid-sized enterprises to reach a common understanding with farmers. The variances between and within coffee farmers in different counties and CSs highlight the importance of carrying out individual assessments for specific farms to help come up with suitable intervention measures.

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Appendix A: Thematic Framework based on SAFA Guidelines

	Theme	Sub-theme	Type	Indicator	Description
Environment	Atmosphere	Greenhouse gases	Target		*The emission of GHG is contained.*
			Practice		1. On site sequestration – afforestation, enrichment of soils 2. Improved livestock & manure management 3. Improved cropland management 4. Restoration of degraded lands 5. Water management 6. Improved fuel efficiency 7. Reduced deforestation & forest degradation 8. Decreased need for fossil based fuels 9. Decreased need for nitrogen fertilizer 10. Decreased methane emissions of ruminants 11. Efficient refrigeration/technical & operational technologies to reduce freight emissions
			Performance	GHG balance	Net direct GHG emission
		Air quality	Target	Reduction target	*The emission of air pollutants is prevented and ozone depleting substances are eliminated.*
			Practice	Mitigation practice	Direction of wind & proximity to polluting sources may increase concentration at investigation site. Proximity to polluting transportation network that isn't controlled for air pollution Old dry damaged berries should be destroyed by boiling or burning
			Performance		
			Score		
	Freshwater	Water quantity	Target	Conservation target	*Freshwater withdrawal and use do not hinder the functioning of natural water cycles; activities do not contribute to water pollution that would impair the health of humans, plants and animal communities.*
			Practice	Conservation practice	1. Efficient water irrigation systems, rainwater harvesting, cultivation of water efficient crops 2. Less water demanding processing technologies vs inefficient water intense processing techniques 3. Inefficient use of water for processing purposes 4. Preservation/destruction of functioning forest ecosystem within a watershed 5. Compaction of arable soils by heavy machinery

	Theme	Sub-theme	Type	Indicator	Description
			Performance	Withdrawals	Share of annual withdrawals of ground & surface water as a percentage of total renewable water
			Score		1. Increase of urbanized areas
		Water quality	Target	Clean water target	*The release of water pollutants is prevented and water quality is restored.*
			Practice	Prevention practices	1. Control the volume & flow rate of runoff water 2. Soil conservation practices 3. Proper storage & application of manure, slurry & silage 4. Appropriate facility wastewater & run off management
			Performance	Concentration of water pollutants Waste water quality	Days of the year where standard water pollution values have been exceeded as a result of activities from the enterprise
	Land	Soil quality (texture, porosity, structure, chemical quality, biological quality[micro & macro])	Target		*Soil characteristics provide the best conditions for plant growth and soil health, while chemical and biological soil contamination is prevented.*
			Practice	Soil improvement & conservation practices	
			Performance	Soil acidity test	No signs of: 1. Soil compaction 2. Chemical soil degradation 3. Biological soil degradation Quantitative or qualitative losses
		Land degradation & desertification	Target		*No land is lost through soil degradation and desertification and degraded land is rehabilitated.*
			Practice	Conservation & rehabilitation practices	
					1. Prevent soil loss - planting living fences, terracing, better drainage 2. Protect soil quality- controlled application of organic fertilizer, slash weeding, reduced pesticide use, biological pest control (parasitic wasps, ants, birds and fungi), cultural pest control (insect traps, smoothening the bark, wrapping the base of tree stems with banana fibre) 3. Prevent soil degradation – limited tillage
			Performance	Net loss/gain of productive land	4. To construct buildings 5. No meaningful use of removed soil material

	Theme	Sub-theme	Type	Indicator	Description
	Biodiversity	Ecosystem diversity	Target	Conservation plan	*The diversity, functional integrity and connectivity of natural, semi-natural and agrifood ecosystems are conserved and improved.*
			Practice	Enhancing practices	1. Maintaining semi-natural habitats with native vegetation & flowers 2. Creation of pest suppressive conditions 3. Greater diversity & integration of plants & animals
			Performance	Structural diversity Land cover change	1. Share of utilized area with high structural diversity of habitats 2. Connected with similar ecosystems with exchange between populations of key species 3. Lulcc within last 5 years
		Species diversity (wild & domesticated)	Target	Conservation plan	*The diversity of wild species living in natural and semi-natural ecosystems, as Well as the diversity of domesticated species living in agricultural, forestry and Fisheries ecosystems is conserved and improved.*
			Practice	Species conservation practices	1. All of utilized areas is covered with diverse crop rotations 2. Poly-culture/multi-trophic system 3. Increased diversity with no increase in imbalances 4. Reduced introduction of alien species 5. Approved species selection by public/private conservation specialists or organisations
			Performance	Diversity of production	Share of utilized land with diverse crop rotation and/or use several species at the same time
		Genetic diversity (wild & domesticated)	Target	Agro-biodiversity in-situ conservation	*The diversity of populations of wild species, as well as the diversity of varieties, cultivars and breeds of domesticated species, is conserved and improved.*
			Practice	Saving of seeds & breeds Locally adapted varieties & breeds	1. Saving of seeds from year to year 2. Minimal lulcc from complex systems
			Performance		1. >50% locally adapted, rare or traditional varieties 2. >5% with non-utilized plants 3. High diversity of wild taxa/species
	Materials & biodiversity	Material use	Target		*Material consumption is minimized and reuse, recycling and recovery rates are maximized.*
			Practice		1. Material consumption practices – replace virgin non renewables (phosphorous fertilizer, fossil fuels, and agrochemicals) with renewables. Replaced synthetic with

	Theme	Sub-theme	Type	Indicator	Description
					natural inputs
			Performance		1. Nutrient balance 2. Share of renewable & recycled materials 3. Intensity of material use/unit produce in the last 5 years
		Energy supply	Target	Renewable energy use target	*Overall energy consumption is minimized and use of sustainable renewable energy is maximized.*
			Practice	Energy saving practices	Practices that have helped reduce energy requirement in the operation e.g. Sun drying
			Performance	1. Energy consumption 2. Renewable energies	1. Change over the last 5 years 2. Share of total direct energy use generated from sustainable renewable sources e.g. Solar power
		Waste reduction & disposal	Target	Waste reduction target	*Waste generation is prevented and is disposed of in a way that does not threaten the health of humans and ecosystems and food loss/waste is minimized.*
			Practice	1. Waste reduction practices 2. Waste disposal	Recycling, reuse, recovery, feasible practices to reduce waste generation Segregation, careful storage
			Performance	Food loss & waste reduction	Share of lost or wasted food Share of reused, recycled, or recovered food
Economy	Investment (time, human resources, funds)	Internal investment	Target	Commitment to generate change accordingly	*In a continuous, foresighted manner, the enterprise invests into enhancing its sustainability performance.*
			Practice	Monitoring system in place Prioritization of activities & practices	Monitoring to oversee sustainability performance
			Performance	Progress in sustainability performance	Attributed to investments in the last 5 years
		Community investment	Target	Identifying community need that needs intervention	
			Practice	Meet some identified community need	
			Performance	Records of multiple positive socio-economic & environmental impacts as a result of investments made by enterprise Acknowledgement of community of effective & positive contribution.	No disproportionate overconsumption of resource in the investments made

	Theme	Sub-theme	Type	Indicator	Description
		Long ranging investment	Target	Business plan with allocated resources	*Investments into production facilities, resources, market infrastructure, shares and acquisitions aim at long-term sustainability rather than maximum short - term profit.*
			Practice	Investments that aim to generate profits	
			Performance	Meeting of current financial needs & obligations	
		Profitability	Target	Positive net income	*Through its investments and business activities, the enterprise has the capacity to generate a positive net income.*
			Practice	1. Calculation of total cost of production 2. Price determination 3. Yield/tree/year	Lower cost of production, increase net income, increase revenue, process to determine the total cost of the product sold & per unit of production to calculate its break-even point Consideration of break-even point to negotiate with buyer
			Performance	Recovery of cost of production	
	Vulnerability (exposure to risk, uncertainty, capacity of households to prevent/mitigate/cope with risk)	Stability of production (quantity & quality)	Target	Guarantee of production levels	Production (quantity and quality) is sufficiently resilient to withstand and be adapted to environmental, social and economic shocks
			Practice	1. Product diversification 2. Risk analysis 3. Timely cultural practices 4. Timely & adequate addition of inputs 5. Appropriate processing practices	1. Wide variety of products, goods, species or varieties of plant or animal for income generation 2. Level of vulnerability vs type & number of products, goods, species & varieties produced/services offered 3. Testing soil fertility & ph once in 2 to 3 years, calculated amounts of fertilizer, apply fertilizer after pruning and weeding, nitrogen should not be applied before rainy season to avoid leaching, timely application of pesticides, liming of soil, weeding, pruning, frequent and timely harvest of mature berries. 4. Providing adequate nutrition a. Nitrogen to ensure the development of new shoots, berries, flowers and allows longer retention of leaves. Adequate application ensures higher quality denser beans. b. Potassium is essential for fruit setting,

	Theme	Sub-theme	Type	Indicator	Description
					bean filling, maturation and hardening of beans. It improves vigour and the pest and disease tolerance of the plants. c. Phosphorous is needed for the healthy and strong development of roots and shoots 5. Fermentation (24 – 36 hrs for arabica) - Over fermentation results in foxy beans and will make the coffee cup sourish & under fermentation results in imparting mustiness in the cup
			Performance	1. Successful implementation of plan 2. Heath of coffee trees	
		Stability of supply (seed, labour, fertilizer, gunny bags, agrochemicals)	Target	Strategy to minimize supply risk & establish diversified supply structure	*Stable business relationships are maintained with a sufficient number of input suppliers and alternative procurement channels are accessible.*
			Practice	1. Procurement channels – 2. Stability of supplier relationships 3. Fair & beneficial terms & conditions with suppliers 4. Risk analysis to identify vulnerability to certain input supplies & suppliers	1. Actions & mechanisms that allow alternative procurement channels 2. Maintaining ongoing business relationship 3. No contracts with suppliers based on fair & beneficial terms & conditions 4. Maintaining business relationship with a number of suppliers
			Performance	1. Dependence on leading supplier 2. Records of unfavorable practices with suppliers 3. Records of unfavorable level of vulnerability to certain input supplies & suppliers	Share of inputs coming from leading supplier Sentiments towards leading supplier Over 5 years
		Stability of market (sufficient number of buyers, diversified income structure, & accessibility of alternative marketing channels	Target	Target a diversified income structure with at least 3 or more buyers	*Stable business relationships are maintained with a sufficient number of buyers, income structure is diversified and alternative marketing channels are accessible.*
			Practice	Maintaining written record regarding the sales agreement, or the purchase order from the buyer.	No buyer should be responsible for a substantial part of annual income from the product sold

	Theme	Sub-theme	Type	Indicator	Description
			Performance	Duration of business relationship Number of buyers Time of selling	Maintaining business relationship for more than a year with written contracts or agreements Allow enterprise to access alternative marketing channels in case contracts, agreements, or business relationships are discontinued
		Liquidity (withstanding short falls in payment)	Target		*Financial liquidity, access to credits and insurance (formal and informal) against economic, environmental and social risk enable the enterprise to withstand shortfalls in payment.*
			Practice	Maintaining/participation in a support network: programmes, institutions, networks, social relationships, & mechanisms	
			Performance	Net cash flow Safety nets(formal/informal)	Does risk analysis recognise financial liquidity as a major risk?
		Risk management (price, production, market, credit, workforce, social, environmental)	Target		*Strategies are in place to manage and mitigate the internal and external risks (i.e. Price, production, market, credit, workforce, social, environmental) that the enterprise could face to withstand their negative impact.*
			Practice	Implementation of actions & mechanisms to adapt & reduce the possible negative impacts	
			Performance	Records that present how the enterprise has reduced the likelihood of occurrence of certain risks, level of exposure & their potential negative impact	
	Product quality & information (totality of features & characteristics that bear its ability to satisfy stated/implied needs)	Food safety	Target	Policy that prohibits synthetic pesticides or promotes organic & natural pest control	*Food hazards are systematically controlled and any contamination of food with potentially harmful substances is avoided.*
			Practice	Control mechanisms	Prevent & control food hazards & food contamination through best agricultural & manufacturing practises e.g. Training of employees
			Performance	4. Hazardous pesticides 5. Food contamination	1. Records of handling, storage or use of any highly hazardous pesticides during last 5 years 2. Records of contamination incidents - endocrine disruptors, immune toxic, genotoxic, carcinogenic, environmental toxic
		Food quality (ota free, taste,	Target		*The quality of food products meets the highest nutritional standards*

	Theme	Sub-theme	Type	Indicator	Description
		cup, look, chemical free)			*applicable to the respective type of product.*
			Practice		
			Performance		
			Score		
		Product information	Target		*Products bear complete information that is correct, by no means misleading and accessible for consumers and all members of the food chain.*
			Practice	Product labelling Certified production	Identification of all ingredients & inputs used
			Performance	Traceability system	Does the system ensure traceability over all stages of the food chain? – records of certification, records of certified procurement
	Local economy	Value creation	Target		*Enterprises benefit local economies through employment and through payment of local taxes.*
			Practice	Regional workforce Fiscal commitment	1. Hiring regional candidates for similar skills, profile, & conditions 2. Paying of taxes as indicated by local regulations
			Performance		
		Local procurement	Target	Procurement policy	*Enterprises substantially benefit local economies through procurement from local suppliers.*
			Practice		Prioritizes the purchase of inputs, products, & ingredients from local suppliers
			Performance	Local procurement	100% selection of local suppliers whenever they can supply inputs under similar conditions
Social	Decent livelihood	Quality of life	Target		*All producers and employees in enterprises of all scales enjoy a livelihood that provides a culturally appropriate and nutritionally adequate diet and allows time for family, rest and culture.*
			Practice		
			Performance	1. Right to quality life 2. Wage level	1. Do all producers & employees in the farm have time for family, rest, & culture, & the ability to care for their needs? – overtime, 2. Do all primary producers/suppliers who supply the farm earn at least a living wage? – employees paid below poverty rate for the region, employees paid by piece rate which encourages unhealthy conditions to reach a living wage
		Capacity development	Target		*Through training and education, all primary producers and personnel*

	Theme	Sub-theme	Type	Indicator	Description
					have *Opportunities to acquire the skills and knowledge necessary to undertake ccurrent and future tasks required by the enterprise, as well as the resources to provide for further training and education for themselves and members of their families.*
			Practice	1. Participation in trainings 2. Transfer of knowledge 3. Training opportunities for all employees	1. Seek & attend trainings from extension agents or local non-profits on improved practices - 2. Recruit apprentices or interest family members 3. Allow workers to attend training sessions from extension agents or local non-profits on improved practices
			Performance		
		Fair access to means of production	Target		*Primary producers have access to the means of production, including equipment, capital and knowledge.*
			Practice		
			Performance	1. Access to agricultural extension officers, or relevant trainings, conferences, & events 2. Access to necessary equipment & facilities	1. Accessibility of further training or knowledge & skill building 2. Significant post-harvest losses, contamination, or other loss of product occur that reduce profits that would be preventable with better equipment or implementation of best practice.
	Fair trading practices	Responsible buyers	Target		*The enterprise ensures that a fair price is established through negotiations with suppliers that allow them to earn and pay their own employees a living wage, and cover their costs of production, as well as maintain a high level of sustainability in their practices. Negotiations and contracts (verbal or written) are transparent, based on equal power, terminated only for just cause, and terms are mutually agreed upon.*
			Practice	Contractual agreements with employees & suppliers	No arbitrary termination or changes to contract Earn & pay own employees a living wage, cover cost of production, maintain high level of sustainability
			Performance		
		Rights of suppliers	Target		*The enterprises negotiating a fair price explicitly recognize and support in good faith suppliers' rights to freedom of association and collective bargaining for all contracts and agreements.*
			Practice	Respect or freedom of association & collective bargaining	Allow employees to raise concerns without fear of victimisation
			Performance		

	Theme	Sub-theme	Type	Indicator	Description
	Labour rights (protect, respect, remedy)	Employment relations	Target		*The enterprise provides regular employment that is fully compliant with national law and international agreements on contractual arrangements, labour and social security.*
			Practice	Legally binding transparent contracts	Compliant with national laws on labour & social security – verbal terms acceptable for small-scale producers
			Performance	Quality of contracts – written/verbal	Contract terms are not clear to employees or employer because of literacy level.
		Forced labour	Target		*The enterprise accepts no forced, bonded or involuntary labour, neither in its own operations nor those of business partners.*
			Practice	Payment of wages on time Penalties Willingness to work	No withholding of full earned wages for any reason e.g. End of harvest season or completion of some quota of work Reduction of pay when employees raise concerns No physical or psychological coercion to pressure worker to work/accept low wages/ dangerous working conditions
			Performance		
		Child labour	Target		*The enterprise accepts no child labour that has a potential to harm the physical or mental health or hinder the education of minors, neither in its own operations nor those of business partners.*
			Practice		No harm to physical or mental health or hinder the education of minors – no full time employment of children, no assigning of dangerous tasks to children
			Performance	Share of work done by children Harm caused to children	Age, type of work, hours of work, conditions of work. Are children of school going age enrolled in school? Ok if: doesn't affect health/personal development, doesn't interfere with schooling, & earning pocket money outside school hours & during school holidays, aim is to transfer skills & experience to children.
		~~Freedom of association & right to bargaining~~	Target		
			Practice		
			Performance		
			Score		
	Equity	Non discrimination	Target	Clear policy of non-discrimination	*A strict equity and non-discrimination policy is pursued towards all stakeholders; non-discrimination and equal opportunities are explicitly mentioned in enterprise hiring policies, employee or personnel policies (whether written or verbal or code of conduct) and adequate means for implementation and evaluation are in place.*

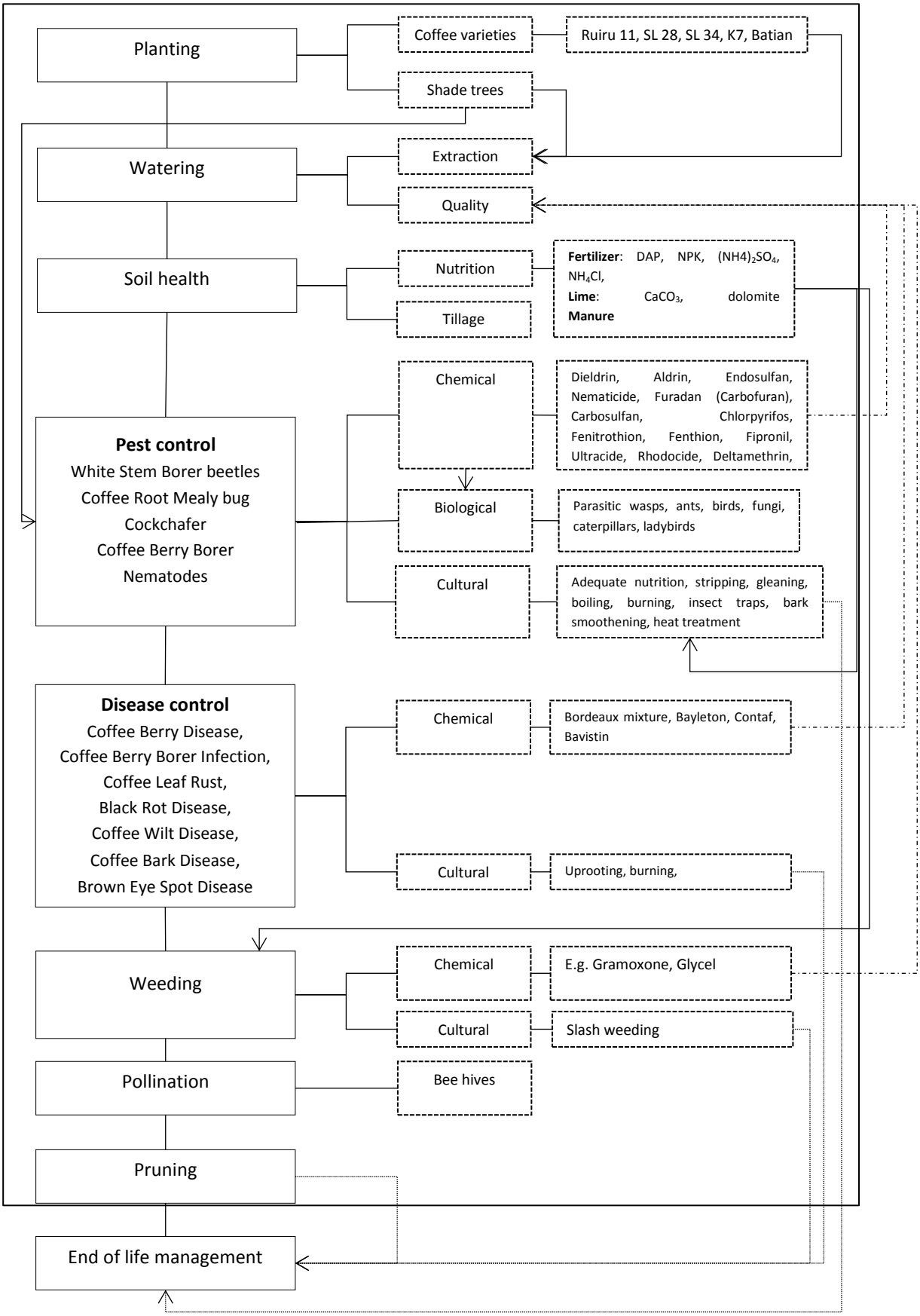
	Theme	Sub-theme	Type	Indicator	Description
			Practice	Equal employment opportunities Equal employment conditions	Race, creed, gender, age, handicap, disability, medical condition, …
			Performance		
		Gender equality	Target		*There is no gender disparity concerning hiring, remuneration, access to resources, education and career opportunities.*
			Practice	Equal pay for similar work Safety for employed pregnant women, nursing mothers Equal opportunities for women – training, positions, …	
			Performance		
		Support to vulnerable people	Target		*Vulnerable groups, such as young or elderly employees, women, the disabled, minorities and socially disadvantaged are proactively supported.*
			Practice		Proactively support vulnerable groups – employees injured while at work, young/elderly employees, women, persons with disability, minorities, socially disadvantaged
			Performance		
	Human safety & health	Workplace safety & health provisions	Target		*Highest degree of physical, mental & social well-being of workers*
			Practice	1. Availability of toilet & clean water 2. Protective clothing 3. Training & safety protocol 4. Availability of tools/machines to reduce drudgery 5. Afirst aid & ccess to medical care	1. Safe & clean working conditions 2. Straining physical work 3. Exposure to harmful substances 4. Work with machines, & equipment
			Performance	Intensity of harvesting season (work-hours/day & /week)	
		Public health	Target		*Operations & business activities do not limit the healthy & safe lifestyles of the local community & contributes to community health resources & services*
			Practice	Measures to avoid polluting/contaminating the local community	Containers used for weedicides should never be used to spray any other chemicals without proper cleaning
			Performance	Impact on local community's resources	Does the enterprise pollute water, air & soils The enterprise expands with consideration for other

	Theme	Sub-theme	Type	Indicator	Description
					residents & their needs – blue gum tree
	Cultural diversity	Indigenous knowledge	Target		*Respects the intellectual property rights of indigenous communities*
			Practice		
			Performance	Recognition & respect for universal rights of indigenous communities to protect their knowledge	
		Food sovereignty	Target		
			Practice	1. Sourcing locally adapted seed varieties 2. Maximises purchases from local producers 3. Avoids changes in production or purchasing that would eliminate seed saving	
			Performance		
Governance	Corporate ethics	Mission statement	Target	Mission driven	*Strong & clear missions based on deeply held values & as members of a community of shared values*
			Practice	Mission explicitness	
			Performance	1. Articulated mission 2. Addresses sustainability 3. Mission explicitness - commonly known by employees & family	
		Due diligence	Target		*Proactive in considering its external impacts before making decisions that have long-term impacts for any area of sustainability*
			Practice	Risk analysis – internal/external	Third party audits Appropriate tools for assessment
			Performance	Rate of losses attributed to unmitigated risk	
	Accountability (disclosure of complete, correct, credible& accesible information)	Holistic audits	Target		
			Practice	Sustainability auditing	Systemic approach to regularly review sustainability performance - formal or informal
			Performance		
		Responsibility	Target		
			Practice	1. Self-evaluation 2. Stakeholder engagement 3. Acceptance of wrong doing	1. Compare performance to mission 2. Inclusion of stakeholder views 3. Responsibility for its impact in disputes with stakeholders

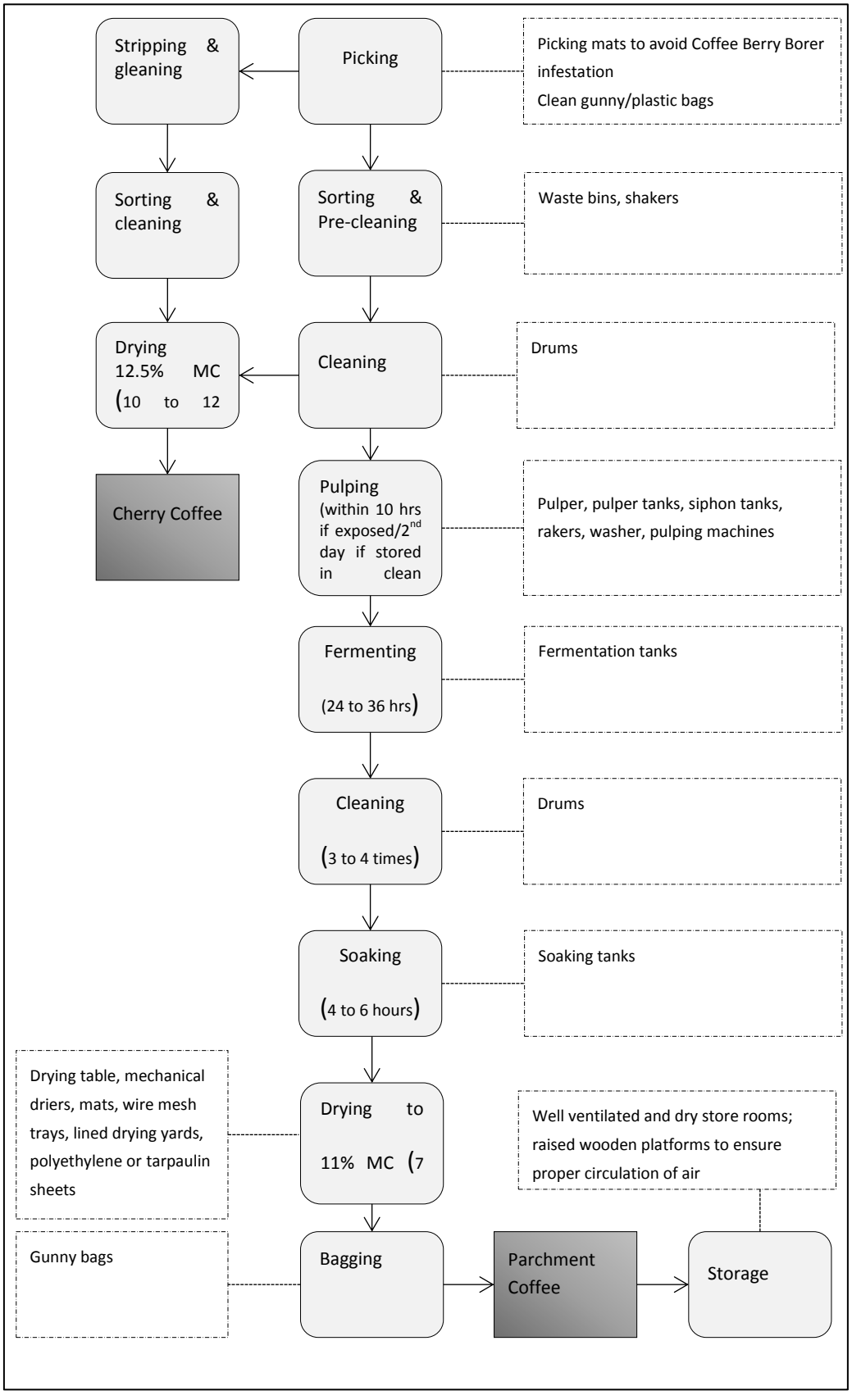
	Theme	Sub-theme	Type	Indicator	Description
			Performance		
		Transparency	Target		*Procedures, policies, decisions or decision making processes are accessible where appropriate publicly, & made available to stakeholders including personnel & others affected by the enterprise's activities.*
			Practice	1. Anticipation of stakeholder information needs 2. Invites stakeholders to rate performance & suggest improvements	Making timely, accurate & relevant information available in an accessible way Clear commitment to transparency
			Performance	Credibility & accuracy of information	
	Participation (stakeholder types – "can affect" & "are affected"	Stakeholder dialogue (SAFA focuses too much on "affected"	Target		*Ensures that it informs & engages with stakeholders that it affects in critical decision making*
			Practice	Stakeholder identification Stakeholder engagement	
			Performance	Engagement barriers	Identification of barriers to engagement for stakeholders
		Grievance procedures	Target		Appropriate grievance procedures without a risk of negative consequences
			Practice	Availability of formal grievance procedures Acceptability of grievance procedures	
			Performance		
		Conflict resolution	Target		*Conflicts resolved through collaborative dialogue based on respect, mutual understanding & equal power*
			Practice	Identification of potential conflicts of interest with & among various stakeholder groups	
			Performance	Examples of resolution through collaborative dialogue	
	Rule of law	Legitimacy	Target		*Compliant with all applicable laws, regulations & standards voluntarily entered into*
			Practice	Endorses risk management strategy to ensure legal & regulatory compliance	

	Theme	Sub-theme	Type	Indicator	Description
			Performance	Cases involving breach of laws, regulations & adopted codes	
		Remedy, restoration & prevention	Target		*In case of any legal infringements or any other identified breach of legal, regulatory, international human rights or voluntary standard, the enterprise immediately puts in place an effective remedy & adequate actions for restoration & further prevention taken*
			Practice	Prompt response to breaches	Description of how breach will be restored or compensated
			Performance		
		Civic responsibility	Target		Supports the improvement of the legal and regulatory framework on all dimensions of sustainability
			Practice	Participation in community *barazas*	
			Performance		
		Resource appropriation	Target		*Do not reduce the existing rights of communities to land, water & resources, & operations are carried after informing affected communities by providing information, independent advice & building capacity to self-organise*
			Practice	1. Free prior & informed consent (FPIC) 2. Tenure rights	1. No action to reduce access to resources without full information, negotiations on equal terms, & provision of mutually agreeable compensation
			Performance		
	Holistic management	Sustainability in quality management;	Target		*Sustainability plan with holistic view of sustainability & considers synergies & trade-offs between dimensions*
			Practice	1. Availability of sustainability plan 2. Articulation of what a sustainability plan entails 3. Implementation of plan	
			Performance		
		Full-cost accounting	Target		*Business success of the enterprise is measured and reported taking into account direct and indirect impacts on economy, society and physical environment (triple bottom line)*
			Practice	Business success measured and reported to stakeholders taking into account triple bottom line	
			Performance		

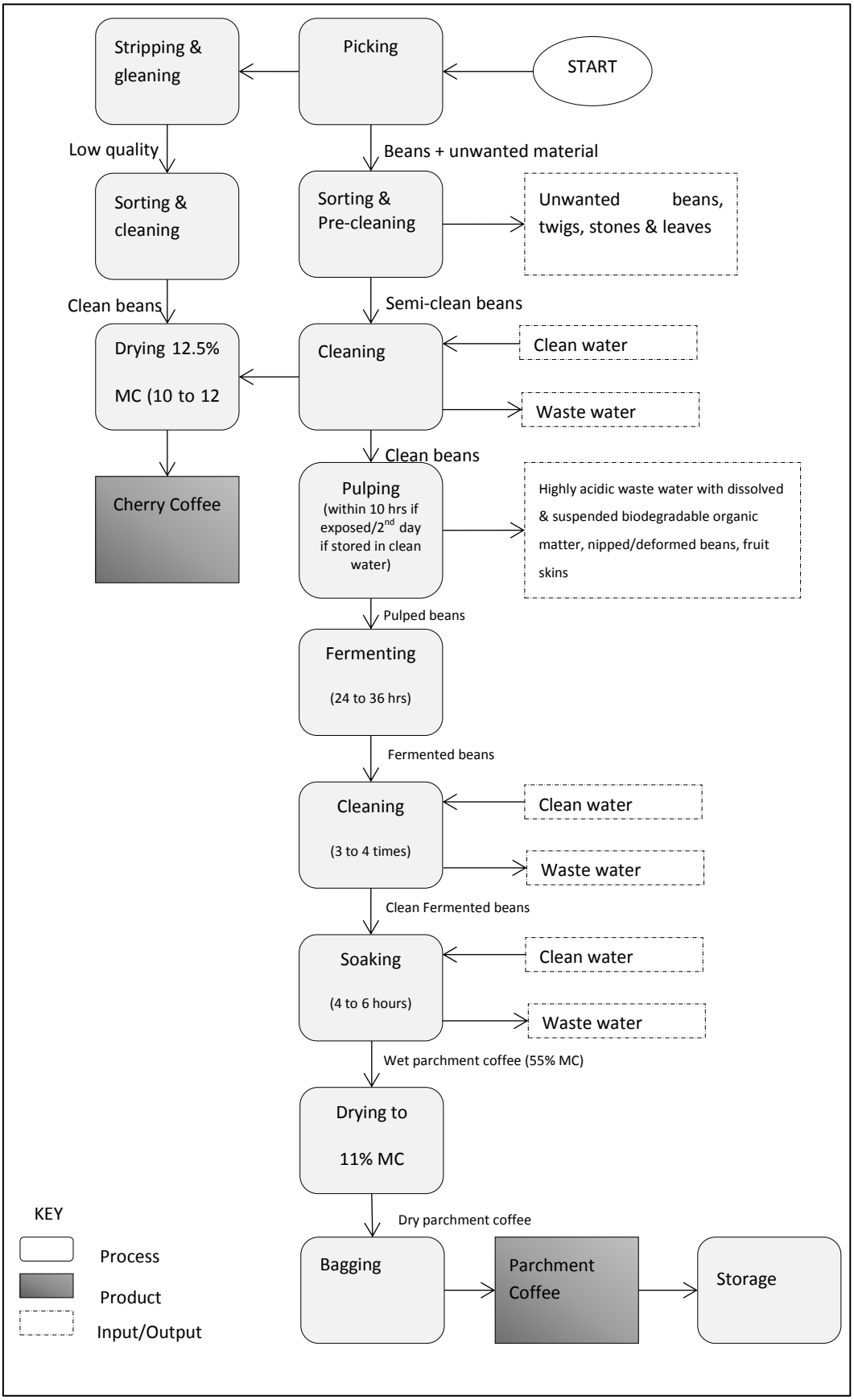
Appendix B: Cultural Practices



Appendix C: Post-harvest practices and primary processing



Appendix D: Post-harvest/primary processing inputs and outputs



Appendix E: Coffee Value Chain in Kenya