KENYAN COFFEE SECTOR UPGRADING IN THE GLOBAL VALUE CHAIN

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DECLARATION

This dissertation is the result of authors own work and includes nothing, which is the outcome of work done in collaboration except where specifically indicated in the text. It has not been previously submitted, in part or whole, to any university of institution for any degree, diploma, or other qualification.

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ABSTRACT

This study was conducted to determine how developing countries can upgrade their coffee production in the global value chain by using systems of innovation. The case of Kenya was undertaken as Kenya has the capacity to produce high quality coffee, yet its position is not strong in the global value chain. When the coffee market was liberalized in the 1990s, only a few countries managed to improve their position in the GVC. The lowering of the coffee price put a pressure on smallholder farmers and places them at the edge of existence.

By using the Explanatory sequential mixed method, firstly the coffee GVC was analyzed using statistical data, and based on the results, the potential for the Kenyan coffee market was brought up. Secondly, by following the results of the quantitative research, the qualitative analysis examined the current situation in the Kenyan coffee market in perspective of NSI.

The outcome of the analysis shows that Kenya has high potential in the specialty coffee industry. However, to achieve a higher position in the global value chain and improve the situation of smallholder farmers, the thesis suggests a set of recommendations.

Improving infrastructure, linkages between various actors, governance and last but not the least, government support may improve the coffee quality and quantity and help to reposition into the specialty coffee global value chain.

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LIST OF ACRONYMS

ACR	African Coffee Roasters
AIS	Agricultural Innovation System
AKIS	Agricultural Knowledge and Information System
BUCODEG	Bungoma County Coffee Development Group
CDA	Coffee Development Authority
CDF	Coffee Development Fund
CR	Critical Realism
CRI	Coffee Research Institute
CT	Convention Theory
DOL	Department of Labor
EU	European Union
FAOSTAT	Food and Agriculture Organization of The United States
GCC	Global Commodity Chain
GDP	Gross Domestic Product
GIS	Global Information Systems
GPN	Global Production Network
ICA	International Coffee Agreement
ICO	International Coffee Organization
IFC	International Finance Corporation
IS	Innovation System
KARI	Kenya Agriculture Research Institute
KARLO	Kenya Agricultural & Livestock Research Organization
KCTA	Kenya Coffee Traders Association
KPCU	Kenya Planters Cooperative Union
LWR	Lutheran World Relief
MNC	Multi National Corporation
NARS	National Agricultural Research System
NCE	Nairobi Coffee Exchange
NSI	National System of Innovation
OBM	Original Brand Manufacturer
ODM	Original Design Manufacturer
OEA	Original Equipment Assembling
OEM	Original Equipment Manufacturer
SABC	South African Broadcasting Corporation
UNAAB	University of Agriculture Abeokuta
USDA	United States Department of Agriculture

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1 INTRODUCTION

In a broader sense this thesis attempts to explore the role of global value chains in upgrading the coffee production in the developing countries. Within that theme the focus is also laid upon the role of systems of innovation that can impact the coffee production and that can potentially upgrade a country's status in the global value chain. In this endeavor, dynamics of global value chains and agricultural innovation around coffee in Kenya are studied in detail. The study aims to contribute to the understanding of how innovation can play a role in enhancing the decreasing quantity and quality of Kenyan coffee and uplifting Kenya's position in the global value chain. In pursuit of the research, two topics are integrated in the economic research: (i) upgrading of coffee production through global value chain and (ii) role of system of innovation in upgrading Kenya's position in the global value chain. Such integration will be a contribution to both areas.

As coffee is a natural commodity and it comes under the realm of natural resources. From this perspective, the topic of coffee production also holds a significant non-academic relevance. According to Ross (1999), twenty-seven of the thirty-six states in the World Bank's extremely troubled category – are primary commodity exporters. In this regard, a better understanding of the coffee industry in Kenya can have far reaching consequences for all the stakeholders involved in the coffee sector.

There are seven hundred thousand small coffee farms in Kenya (USDA 2016). Hence, smallholder farmers can have a major contribution in the overall coffee production. World coffee consumption has been increasing steadily at an annual growth rate of 2.1 percent over the period 2006-2016, with total consumption at 9.1 million metric tons in 2003 (USDA 2017). The coffee sector has been an important part of Kenya's overall economy since 1990s. However, there has been a persistent drop in Kenya's coffee yield, quality and export (Condliffe et al. 2008). In light of the increasing global consumption, enhancing the

production quality of smallholder farmers in developing countries – in this case, Kenya—can lead to an enhanced economic performance of the whole country.

The world coffee market is characterized by a dominant role of few large producing countries, with only five producers accounting for two third of the world's coffee export. Looking at the data from the year 2006, the top three producers in terms of export volume were Brazil (30%), Vietnam (15%) and Colombia (12%). Brazil has consistently been the world's largest Arabica producer in the world, while Vietnam has relatively emerged not so long ago, secures the position of world's largest Robusta producer – lower in quality as compared to Brazil's robusta (Condliffe et al. 2008). Recent data also depict that Arabica production in Brazil has increased at a record rate in the year 2016/17 and Columbia's production also continues to rise, at the same time Kenya secures only 0.4 percent of the world coffee production (USDA, 2016). Growth in the production from world leaders put Kenya and other developing countries with coffee production under immense competition for different quality of coffee markets. The growing demand of coffee consumption in the world specially in producing countries opens a window of opportunity for Kenyan coffee market. Additionally, Kenya has one of the best conditions to grow highest quality coffee with the 11th largest endowment of arable land in sub-Saharan Africa. In these circumstances, it is really important for Kenya to enhance its coffee quality and quantity to increase the coffee export in order to improve the economic performance (Condliffe et al. 2008).

Coffee farming in Kenya holds a very little incentive for smallholder farmers. Farmers get a very small and ever declining share. By the year 2010, coffee growers in Kenya captured only ten percent share of the retail price as the downstream players became more consolidated (Talbot, 2004). Furthermore, the context for rivalry is heavily interfered by the government that makes the market structure very complicated and fades the sense of competition among different actors. These factors also play a significant role in declined profits of the coffee sector in Kenya. The internal complex market structure creates a restrictive environment for smallholder farmers to interact directly with the coffee exporters and buyers. It leads to the exclusion of one of the main actors—smallholder farmers—from the global value chain and consequently Kenyan coffee buyers are not effectively communicated regarding the coffee quality and producers do not get adequate returns from their crops (Condliffe et al. 2008).

According to Pietrobelli, & Rabellotti, (2011), one of the strands in literature analyzes the role of global value chains on the process of innovation and learning in developing countries. They further assert that learning and innovation are the key factors for competitiveness and growth of countries. In addition, learning and innovation are affected by macro

contexts of countries as well. Furthermore, GVCs can contribute to improving the local innovation system which affects decisions about local sources of inputs and support for local actors' learning and innovation. Hence, there is a mutually affecting link between GVC and IS. GVC provides new markets and sources of learning for different actors, and in return local actors can supply better quality products to new markets (Pietrobelli, & Rabellotti, 2011).

Smallholder coffee farmers bring their products in markets through a very complicated structure in Kenya. They are required by law to sell their coffee through local growing cooperatives. In this course of indirect entry from farmers to GVC, farmers don't get any chance of learning about international standards and demands and in affect their end product lacks improvements in quality through innovative practices (Condliffe et al. 2008). The situation makes it imperative to conduct an in-depth study of GVC and IS pertaining to Kenyan coffee market that can suggest ways to improve the livelihoods of more than seven hundred thousand smallholder farmers and that can help Kenya to improve its position in international market.

1.1 Problem Formulation

According to Eakin (2009), coffee is a global commodity that is a conglomerate of complexities and inter-dependencies between smallholder farmer's livelihood outcomes, globalization and environmental change between different geographically dispersed locations. More than ninety percent of coffee production takes place in the developing countries in the subtropics, where the climate is suitable and labor is cheap. Today coffee crop mostly comes from around 20-25 million small scale farmers that largely depend on unpaid family labor or hired labor during the harvest season.

As mentioned earlier the performance of the Kenyan coffee sector has been on the decline, resulting in decreasing coffee quality and yields. This in turn has an adverse impact on the livelihood of the smallholder farmers in Kenya. Due to the involvement of seven hundred thousand farmers in Kenyan coffee sector, the declining performance has implications for the whole economy (Condliffe et al. 2008)

Coffee growers from Kenya used to capture 30 percent of the value of the final retail price in 1975, by 2000 they captured only 10 percent of the retail price. The situation deteriorated further over time and by the year 2014, farmers captured only between three to six

percent of the value of the retail price (Kieyah & Lesiyampe 2016, pp.32–33). The low value captured by farmers is attributed to the complex internal structure of the coffee market in Kenya where downstream players are becoming consolidated and these players act more as rivals for profit instead of creating an environment that is beneficial for all the stakeholders especially for smallholder farmers (Talbot 2004)

In this situation, Kenya is facing not only external challenges—where Kenya is losing shares in the global value chain—but also internal challenges that lead to low export due to decreasing quality and quantity of the coffee. The research question therefore deals with declining role of Kenya in the global value chain (GVC) and the national system of innovation (NSI) that instigates the problem:

How can developing countries upgrade their coffee production in the global value chain by using systems of innovation? The case of Kenyan coffee sector.

The factors, contributing to Kenya's declining role in the GVC, are associated with the internal functioning of the sector that constitutes a system of innovation. Hence, Kenya's coffee GVC is studied from a perspective of internal NSI. In this regard, the sub-questions derived from the main question dealing with the GVC and NSI are:

a) **How can Kenya position itself in the current Global Value Chain structure in order to upgrade its position?**

The upgrading implies processing of coffee in Kenya and delivering the end product to consumers, which is done at a very small scale and that can enhance profits for different actors in Kenya. The answer to above question will lead the study to analyze policies and system that can support Kenya's position in the GVC. In order to reach that goal, the next question takes the national system of innovation into account for upgrading.

b) **How can the NSI helps Kenya to enhance the quantity and quality of coffee in order to gain a higher share in the GVC?**

The theory and analysis reflect upon these dimensions, and the study is an attempt to systematically understand these issues faced by the Kenyan coffee sector through responding to the proposed questions.

1.2 Thesis Structure

After the introduction, the case is presented and gives an idea about the dynamics of the coffee sector and its role in the Kenyan economy. The case presentation also provides a brief description of problems pertaining to the Kenyan coffee sector, especially for small-holder farmers. Chapter three is dedicated to develop a methodology for the empirical analysis that combines the presented concepts. Reflections on data collection, limitations and validity of the study are presented.

Chapter four and five present theoretical inputs from a broad literature review on global value chain and national systems of innovation, respectively. Combined, these concepts and literature make up a road map for upgrading in the global value chain through enhanced practices in national systems of innovation. The literature review on the global value chain presents a theoretical foundation for studying dynamics of upgrading. The literature review for national systems of innovation takes into account practical examples and theoretical approaches that are relevant for agriculture of developing countries. These chapters, serve a detailed outline of the content of the global value chain and national system of innovation in relevance to the Kenyan coffee sector, thus serves as a platform for answering the research question.

Chapter six describes the coffee sector from a historical perspective. This chapter helps to understand the need for innovation and different coffee periods focusing on the global perspective. It was emphasized what caused the change in the market and how this influenced the position of different coffee producers.
Chapter seven and eight are based on the GVC and NSI analysis, respectively. In Chapter seven, operationalization is done in the start to systematically use the data, and provides a starting point for the qualitative analysis. The chapter that follows gives a holistic analysis of NSI regarding the Kenyan coffee sector. This chapter takes a holistic approach into account by understanding the role of public and private institutes, coffee farmers and bilateral organizations, as the Kenyan coffee sector is based on intricate relationships between different actors.
Chapter nine and ten contain concluding remarks and a discussion where the initial research questions are discussed with a synthesis between GVC and NSI. Chapter eleven contains recommendations that are devised to address the problems identified through the analysis.

2 Case Presentation

Kenya is developing country in eastern Africa that borders Somalia, Ethiopia, Uganda and Tanzania. It has a population of almost 48 million citizens—31th highest in the World—and with English and Kiswahili as the official languages. One third of the population lives in urban areas and 80 percent of the population works at least part-time in the agricultural sector (CIA 2017). Kenya is former colony of the United Kingdom, and it gained independence in 1963. Different waves of immigration made it one of the most culturally and linguistically diverse country and it therefore, contains many different tribes (Senaji & Galperin 2017).

A bit less than a half of the country's 580 thousand square kilometers is agricultural land and the Kenyan Highland region contains one of the most successful agricultural production regions on the continent (CIA 2017). Albeit a large majority of people work in the agricultural sector, it presents only 30 of percent of Kenya's GDP, however, according to Namboka et al. (2017), agriculture indirectly contributes another 25 percent to the GDP and its increasing performance leads to improvements in the off-farm sectors. Despite promising economic indicators—average GDP growth above 5 percent in the last 7 years—(CIA 2017), Kenya is suffering from a high level of corruption, which was widened under the current administration after a series of corruption scandals (Senaji & Galperin 2017). According to Transparency International (2017), it's corruption perception index is 26 and this ranks it on a 145th place out of 176 countries included in the report.

In the last few decades, Kenya has suffered under different climate related events—droughts and floods—which presents risks for countries that are highly depend on agriculture. Referring to Downing et al. (2009), these extreme events result in macro-economic costs and hinder economic development. In aggregate models, scholars from the Swedish Environmental Institute predicted that Kenya's GDP will be hindered by 3 percent annually till 2030. Even though the extreme climate events cannot be minimized in a short period of time, Kenya may adopt to new circumstances. However, this has its price too, and in the same model scholars predicted that they should spend around 500 million USD in the first years to more than a billion USD in year the 2030 (Downing et al. 2009).

Coffee crops in Kenya is a major part of the agricultural sector. The sector is based on a collective effort of different actors that support the cluster today. There are institutions in the coffee sector that work on a national level to fulfil different demands of inputs. The majority of the coffee producers are the smallholder farmers that counts 700 thousand in

number. Together these farmers are presented by the Kenya Planters Cooperative Union —KPCU—which is a private non- profit organization that works in the interest of farmers. These farmers work with cooperatives for the processing of their crops. Cooperatives provide different facilities to farmers ranging from provision of financial loans, fertilizers, milling facilities, and the cooperatives export the coffee through their marketing agents on behalf of smallholder farmers (Muthoni 2014).

Despite of the presence of supporting institutions, the Kenyan coffee sector does not provide a very conducive environment for the smallholders (Kinoti 2005). Smallholders get only a minute fraction of the value. By 2000 they captured only 10 percent value as downstream players became extremely consolidated (Talbot 2004). Smallholders have to face a lot of restrictions limiting their role in the value chain that attribute to the little value captured by them. Smallholders are subject to sell their coffee through local growing cooperatives. There are 569 cooperatives that rarely compete with each other, as farmers have to process cherries within 24 hours of harvest (Mude 2006). They are compelled to work with the closest cooperative due to limited access to transportation.

Kenya coffee sector has been characterized by monopolistic roles of different actors who work either solely or with meagre competition at different stages of the value chain. When it comes to coffee milling in Kenya, it is managed by only five firms and they take coffee from marketing agents to sell at the auction. Kenya coffee export is at the mercy of these agents as they are the only groups that can participate in the coffee auction, which is held weekly at the Nairobi Coffee Exchange. The industrial structure of Kenya coffee sector also imposes another setback on the performance of farmers. The coffee grown at different farms is processed separately, sometimes it is mixed together at the milling stage and sold by lot to exporters. The mixing of coffee reduces the incentives for farmers to produce quality coffee as they are not paid based on the quality of their coffee but they are paid based on the revenue generated by the whole lot. As a result, farmers do not earn enough money to buy inputs for further yields, hence the quantity and quality of their crops has been decreasing persistently (Condliffe et al. 2008).

3 METHODOLOGY

This chapter presents how the idea for the thesis was generated, whether it originates from an organizational scenario or from an interesting situation. Moreover, the process of data collection and the methods for analyzing them are described. During the first two semesters of the MIKE program, the topic of catching up by developing countries was studied. Furthermore, during one of the author's internship opportunity at GlobeLics, a deeper understanding of the topic was gained. At the initial stage of the master thesis writing both authors found a common interest in the topic of development and after the first meeting with the supervisor the decision for studying the Kenyan coffee sector was made. Familiarity with the concepts of GVC and NSI led to the formulation of the structure of this thesis's problem formulation.

This project aimes to answer how developing countries can upgrade in the GVC by using systems of innovation. To provide an answer, firstly, the global coffee chain was investigated with the GVC analysis, which addressed the ways and opportunities of upgrading for developing countries, in this case Kenya. Secondly, the Kenyan coffee sector was researched by using the NSI framework in order to detect the current situation and recommend the policies to use the upgrading possibilities found in the GVC analysis. To provide a better understanding of the investigated phenomenon, theoretical triangulation was used. According to Kuada (2012) the researcher could construct the *operative paradigm* by using different meta-theoretical perspectives.

In that way, both the GVC and NSI concepts were used to address the same phenomenon, each from their own perspective. Moreover, the use of theoretical triangulation decreases different explanations for an investigated phenomenon and challenges scholars to look beyond the obvious interpretations. Consequently, this leads to a more complex project design, thus the design has to be discussed in detail to give readers a clear view of the analysis process.

As mentioned, the thesis analyzed upgrading opportunities in the coffee GVC for Kenya by using NSI. According to Pietrobelli & Rabellotti (2011) the GVC analysis does not pay enough attention to the institutional context of the local actors—in this thesis the Kenyan coffee market. It is highly relevant to analyze rules, values and institutions that characterize the local industry. Lundvall (1992) emphasized different elements and relationships—national or international—that interact between the production, diffusion and 'the use of new', and together they determine the market.

Considering the above-mentioned limitations, the NSI analysis focused on the actors and linkages within the Kenyan coffee market and thereby directed how the thesis could answer the research question. The following sections will discuss the research approach, the philosophy of science, the research methods and the case study, followed by the data collection description. At the end limitations and validity of the project are presented.

3.1 Research approach

In order to give readers a better understanding on the thesis, the research approach should be defined. The relationship between the theory and research can be characterized either as an inductive or deductive approach. The first one—mainly used in qualitative research—uses the collected data for developing a theory and in the second one—used in the quantitative research—the theories are the premise for the data collection (Bryman & Bell 2016). According to Morgan (2007), in some researches both approaches are used, starting with empirical analysis, which findings then relate to an existing theory that tried to be verified at the end. This moving back and forth between different approaches is named abductive research. This thesis consists of both approaches and follows Explanatory Sequential Mixed Methods that starts with a quantitative—deductive—and follows up with qualitative approach—inductive (Creswell 2014), therefore abductive research approach was used. Looking from the process perspective, first the GVC literature provided types of data that had to be collected to analyze the coffee GVC and its results guided us to collect data from the Kenyan coffee market. Those data were later analyzed using NSI frameworks and together helped to answer the research questions.

3.2 Philosophy of science

The philosophy of science refers to the relationship between truth and science, and thus, explains the researchers' view on the investigated subject. The defined project's underlying assumptions ensure that it is conducted in an appropriate way. The assumptions consist of how the researchers perceive the ontological reality—a theory of the nature of social entities—and which knowledge is valuable for the research (Kuada 2012).
According to Easterby-Smith et al. (2012) the awareness of philosophical underlying assumptions improve the quality and creativity of the research, however, they think it is a shame that some social science resaerchers only follow the already established traditions in their field of training.

Ontology is the researcher's assumption about the nature of reality and from a broad perspective, the world is either real and external or every induvial makes his own social world. Moreover, ontology also describes the relationship between individuals and environment; either he is out of the environment or individuals and environment codetermine each other (Kuada 2012). Due to the theoretical triangulation, the project consists of two different ontologies. The **Internal realism**—used in the GVC analysis—believes that there is one reality—truth— about the phenomenon and it is hard for a researcher to gain it directly, but rather with indirect evidences this can be obtained (Easterby-Smith et al. 2012). The authors of this thesis believe that there is one reality in the coffee GVC and by analyzing different indirect market fundamentals tried to get an understanding of it. The NSI analysis investigated different stakeholders in the Kenyan coffee market and each of them has its own view on the phenomenon. Therefore, the authors see that there are many different realities—truths—and they depend on the each actors' viewpoint—**Relativism** (Easterby-Smith et al. 2012).

Table 1: Underlying assumptions

Concept	GVC	NSI
Ontology	Internal Realism	Relativism
Epistemology	Positivism	Constructionism
Aim	Exposure	Convergence
Data:	Databases, reports and academic articles	Market experts' articles, reports, academic articles
Analysis	Correlation and regression	Triangulation

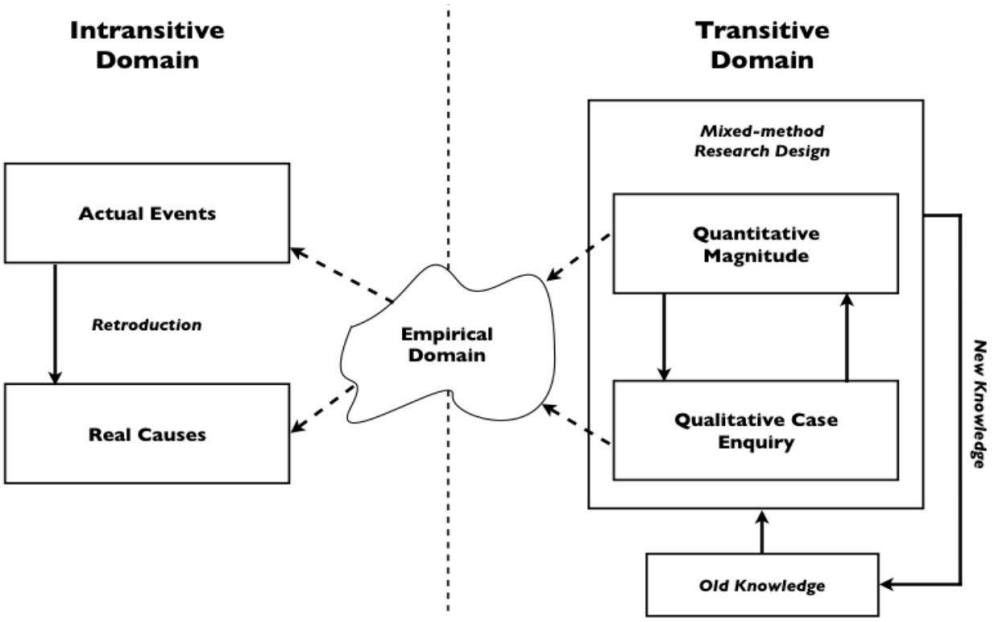
Source: Authors. Adapted from (Easterby-Smith et al. 2012, p.25)

Epistemology defines the nature of knowledge and means of knowing. The researcher stands either on a position that one is able to know the truth of the social world or that the social world should be researched intersubjectively, by studying different relationships between the actors' views (Kuada 2012). The researchers' viewpoint in the coffee GVC analysis is **Positivism**, as they believe the chain exists externally and should be studied by using objective methods to demonstrate causalities. Contrary, the Kenyan coffee market is perceived as a construct of different experts and actors' viewpoints and the researchers aimed to increase the general understanding of the market—**Constructionism**.

3.3 Paradigm

Guba & Lincoln (1994) define a paradigm as a viewpoint of the research and consists of a set of beliefs—ontological, epistemological and methodological—and they guides a scholar while making decisions and carrying out the research. This thesis used a mixed methods research, which was established as a third methodological movement and its development has been accompanied with searching for a proper paradigm (Hall 2013). Hall proposed different single paradigms for the mixed methods research and after reviewing them, the authors decided to use **Critical Realism**—defined by Sayer—, which is compatible with both quantitative and qualitative methods. According to Zachariadis et al. (2013), different modes of interference—methods—could be used to explain a researched phenomenon and the switch between different methods is called **Retroduction**. The critical realism—CR—differentiates between the world and how we experience it, and also between the empirical, the actual and the real. The *empirical* contains one's experiences of what happens in the world; the *actual* is compounded by one's experiences and as well by events, freely of whether he experienced them or not; and the *real* consists of the powers and structures objects, that could be seen as mechanisms with generative power—e.g. to make events (Sayer 2000).

Figure 1: Critical Realism Paradigm



Source: (Zachariadis et al. 2013, p.5)

In Figure 1 by (Zachariadis et al. 2013), the paradigms demonstrate the connection between intransitive—exists independently of our knowledge or perception of it—and the transitive domain—knowledge creation. CR is used in many fields and was found useful in (Koutsouris 2012) research of Agricultural Innovation Systems and its development.

3.4 Research methods

In this research, different data were gathered according to the underlying assumption explained in the paragraphs above. To analyze the GVC, various datasets for the global coffee industry were scanned and different market expert's opinions were collected for the local coffee industry. Both analysis used institutions' reports and academic articles to implement the data.

3.4.1 Single case study

The case study is used to understand a real-life phenomenon in depth and it consists of six procedures, i.e. plan, design, prepare, collect, analyze and share. It's research design has to contain five components (Yin 2009, p.27):

- A study question—starting with "how" or "why";
- A study proposition— capturing what you are really interested in answering;
- A unit of analysis—a clear definition allows to establish a scope and boundaries in data collection and analysis;
- the logic linking of the data to the propositions—how data will be matched to the topic;
- A the criteria for the interpretation—identification and addressing rival explanations.

Yin (2009) defined five rationales for choosing single-case design: *critical, unique, representative, revelatory* and *longitudinal case.* This thesis aims to study upgrading possibilities in the coffee GVC for developing countries with Kenya as its case study. Kenya shares common problems regarding production of coffee with other East-African countries. Despite good geographical conditions for high quality coffee, Kenya still struggles in GVC participation. Moreover, the used concepts have specified a clear set of propositions as well as the circumstances for the phenomenon, thus this study makes a combined critical and representative case study.

3.4.2 Triangulation

As mentioned in the beginning of the chapter, the thesis used theoretical triangulation—GVC and NSI and mixed-methods. The latter is also referred to as methodological triangulation and according to Thurmond (2001, p.255) it:"…has the potential of exposing unique differences or meaningful information that may have remained undiscovered with the use of only one approach or data collection technique in the study." As already mentioned, the thesis uses Explanatory sequential mixed methods, defined by Creswell (2014, p.243) as:

> *"strategy that involves a two-phase project in which the researcher collects quantitative data in the first phase, analyzes the results, and then uses the results to plan—or build into—the second, qualitative phase."*

However, the problem of using methodological triangulation may appear if the research design is not suitable if researchers lack in either method, and it could be difficult to mesh numerical and narrative data for the understanding of a phenomenon (Thurmond 2001). According to Gillham (2000), qualitative methods are predominant in the case study, nevertheless, quantitative data analysis can add to the overall picture. Both descriptive and inferential statistics may be used. Especially abstracting data from records over time could help make sense of the situation of the researched phenomenon.

The project's case study was studied with mixed methods and the coffee GVC was analyzed with both a descriptive and a time series analysis, which gave results to make claims for changes or improvements for the Kenyan coffee market policy structure. Additionally, Kenya's position was investigated in each of the studied market fundamentals.

3.4.3 Quantitative Research and Data Collection

Quantitative data collection methods and techniques are usually used in research where authors subscribe to an objectivist view on reality and therefore, uses positivist epistemology (Bryman & Bell 2016). The GVC statistical time-series analysis is important to motivate the research purpose and understand the evolution of the variables as well as links between them. Firstly, correlation between different market fundamentals—price, production, consumption, stocks—were conducted, and then a linear regression depicted the effects of different factors on the international coffee market price. Finally, the analysis of

evolution patterns—domestic consumption in exporting countries, re-export, yield efficiency—provided possible ways for upgrading in the GVC. These presented the starting point for the qualitative research presented below. Statistical data were organized and analyzed with the open-source software RStudio, which is an integrated development environment for R, a programming language for statistical computing and graphics (RStudio 2017).

For this purpose, a panel composed of variables (Appendix 2) from three sources were built by scanning different international institution's databases. The main sources were from the International Coffee Organization database (ICO 2017) and the United States Department of Agriculture database (USDA 2017). Data on yield efficiency were collected from the Food and Agriculture Organization of the United Nations statistics (FAOSTAT 2017). Additional data used in this part of the analysis came from different reports and from other scholars' articles researching the same phenomenon.

3.4.4 Qualitative Research and Data Collection

Qualitative methods present a wide variety of data collection methods and basically include any type of research, which findings are not a result of statistical procedures or other means of quantification. They emphasize on 'cases and contexts' and have genuine interpretations that are sensitive to specific social-historical contexts (Kuada 2012).

In the NSI analysis, articles from various Kenyan market experts were collected from coffee industry newsletters and journals. They provided a subjective view on the market, the institutions, the problems and potential solutions. The information about different initiatives were found on the internet and on Kenyan TV news. The market experts' articles were coded with NVivo, a data analysis computer software, that helps researchers to ease the coding process, mostly used in qualitative research. The authors used it to organize and analyze nonnumerical or unstructured data gathered from the experts' articles, to identify similarities and correlations between the statements.

3.4.5 Limitations

The first research design contained the interviews with the Kenyan local experts as the primary data for the qualitative part. After the first attempts to establish a contact with potential interviewees, the authors were informed that Kenya demands a research permit from the Kenyan National Commission for Science, Technology & Innovation. Despite the request, the permit was not granted and consequently, the articles by market experts were

used. The second limitation originates from the selected research approach, as it has a rather complex structure and thus, requires an in-detailed explanation to gain trustworthiness.

3.4.6 Validity and reliability

Part of the thesis analysis came from the qualitative methods, which are many times questioned by positivists regarding trustworthiness. Shenton (2004) collected different incorporated measures to achieve it: *Credibility*, by adopting appropriate methods; *Transferability*, presentation of background data; *Dependability,* in-depth methodological description and *Confirmability, the* use of triangulation reduces investigators' bias.

In this study, trustworthiness was increased by using mixed-methods, in-depth methodological and data description and by using triangulation. Moreover, by using opinions of several experts from the Kenyan coffee market— Head of Technical Services in Coffee Directorate, Marketing Expert, Agribusiness Expert, Credit Manager at the Coffee Development Fund—different perspectives on the phenomenon were obtained.

4 GLOBAL VALUE CHAIN

4.1 The chain analysis development

Global value chain concept explains the political economy of a contemporary global production system. In the last few decades, it has been extensively used by scholars, industry and development practitioners, and its field of study varies from natural resources, agriculture, industry and high-technology. Thus, one could argue its usefulness for researching such commodities, products or even services. The GVC is a result of evolvement of different chains and to justify its appropriateness, its evolution was presented in the following sections. Its first footprints could be detected in Hopkins and Wallerstein's The World Systems Theory from 1977 (Neilson 2008), which was aiming to replace the Modernization theory. According to Barfield (2000) their main criticism towards the Modernization theory was focused on the nation state as the only unit of analysis, the premise that there is only one path of evolutionary development for every country and its negligence of transnational structures as constraints to local and national development.

Hopkins and Wallerstein (1986, p.159) defined Commodity chain as: *"a network of labor and production processes whose end result is a finished commodity"*, and where different international networks link together to produce a commodity. Moreover, the linkages that connected enterprises, states and households, were socially constructed, locally integrated and consequently specific for each situation. The authors saw chains greatest merit in its emphasis on process (Gereffi & Korzeniewicz 1994).

In the second half of the previous century, scholars started to research different linkages between companies on a micro level or between countries on a more macro level. These linkages presented processes, where one commodity or product went through different stages, mainly in different locations. Some of the researchers built their models on the agriculture sector (Friendland in 1981, Fine & Leopold in 1993, etc.) and others from manufacturing (Helleiner in 1973, Hymer in 1972, Oliver in 1985, etc.). Next section briefly describes the most influential examples of chain variations.

4.1.1 Variations of Chain frameworks

In the same time as Hopkins and Wallerstein developed Commodity chain, different scholars introduced other variations of the chain frameworks. Bair (2009) emphasized on few major commodity chains that pertain to agriculture and food. The first one is Friedland's **Commodity System Analysis**—based on the "*new political economy of food and agriculture*"—focusing on technological change and its effects (Bair 2009). Before the 1980s, agricultural economists focused on the particular commodities but less on their system—social, cultural or political aspects—and similarly rural sociologists overlooked research on agricultural matters (Friedland 2001). Although sociology of agriculture slowly enhanced in rural sociology, there was still no methodology to properly conduct the research. Thus in 1984, Friedland introduced sociological attempt as a methodology—Commodity System Analysis—, which applied five categories: production practices or labor process, grower organization, labor, science production and application, and finally marketing and distribution. However, scholars later agreed that this framework oversight consumption and cultural part (Friedland 2001). Comparing to Wallerstein's Commodity chain, this framework was built on different traditions of conceptual drivers, objects of study and modes of analysis (Bair 2009).

In 1994, Ben Fine tried to link consumption with a commodity chain and introduced the **System of Provision**, which included all forms of consumption and they presented the next step in Friedland's vertical analysis, right after marketing and distribution (Friedland 2001). Fine & Leopold accentuated on the details of the consumption-production relationships for a specific commodity and how it is *"distinctly structured by the chain or system of provision that unites a particular pattern of production with a particular pattern of consumption"* (Fine & Leopold 1993, p.4).

The third chain-like example in agriculture studies originates from 1960s and is the oldest of the above-mentioned approaches. **The Filière approach** was introduced at the French National Institute of Agricultural Research and the Agricultural Research for Development in France. The primary need for this approach came from developing colonial and post-colonial French states that were commodity-centered and based on agriculture (Bair 2009). According to Raikes (Raikes et al. 2000), the Filière approach is based on different theories and methodologies—system analysis, industrial organization, management science etc.—and it is a combination of different chain models. Furthermore, the field of analysis is more on a "meso-level" than a theory. When the World Bank insisted on the

liberalization of the coffee, cocoa and cotton chains in francophone Africa, this approach justified the use of stabilization funds and showed the first negative effects of liberalization in developing countries.

As explained earlier, the above three frameworks originate from agriculture and the authors addressed the changes in world's food production in different ways. On the other hand, other authors focused more on commodity manufacturing, therefore their chains have different starting points and consequently varies from the above mentioned.

In 1973, Helleiner published his version of the **International Production Network**, which focused on the Multi National Corporations'—MNCs'— role in industry restructuring in developing countries (Bair 2009). This restructuring happened by integrating trade on one hand and disintegration of production on the other hand. Helleiner assumed the MNCs would incorporate less-developed countries into their production network not only as suppliers of raw material, but manufactured products too, therefore his model consists of *processing, assembly and component manufacture*. Hymer went further and predicted that MNCs will not only geographically relocate their production but also externalize it to other independent firm's networks. Furthermore, Hymer predicted that design will become the most important element in a commodity development, followed by investment in development and marketing, and at the end production (Bair 2009).

The next contribution to Helleiner and Hymer's researches was **Supply Chain Management** by Keith Oliver, which uses a micro approach. It aimed to help establish a balance between a firm's goals and customers' needs by analyzing the *"management of a chain of supply as though it were a single entity, not a group of disparate functions"* (Laseter & Oliver 2003, p.33). On the same level of analysis—micro—, Michael Porter's value chain focused on the relationship between actors and activities within an organization, and how those connections link to other organizations' chains. The organization's chain, consisted by backward linkages to suppliers and forward to customers, are often international, therefore Porter's model is presumed as a Global supply chain (Bair 2009).

Researchers from the Manchester School introduced **Global Production Network**—GPN—, which combines insights from GCC/GVC analysis and uses ideas from The Actor-Network Theory in order to connect understanding of clustering dynamics and sub-national regional development (Coe et al. 2008). The model was also a critic of Global Commodity Chain—GCC—, mainly towards the authors' ignorance of the spatial dimension of chains (Bair 2009), therefore GPN is more *"a relational and specifically geographic approach to the study of the global space-economy"* (Hess & Yeung 2006, pp.1196–1197).

Authors also added that differently than other chains, GPN puts more distant actors—such as firms and institutions—into the same analytical framework and thereby creates a dynamic theoretical structure that show power relations and multiple scales.

Table 2: Different value chains

World-system Theory	**GVC (GCC)**
Commodity System Analysis Friedland 1981	Global Production Network Manchester school
System of Provision Fine & Leopold 1993 2002	International Production Networks Helleiner 1973 Hymer 1972
Filiere Approach 1960s	Supply Chain Management Oliver 1982 Supply Chain Porter 1985

Source: Authors

As shown in the Table 2, chain variations originating from agriculture are closer to World-system Theory and those originating from manufacturing have more similarities with Global Value Chain. Thus, in the next section main differences between two traditions are presented.

4.1.2 Commodity chain vs Global Value Chain/GCC

Hopkins and Wallerstein (1977) based their chain as contradiction to a rather orthodox view on globalization and its relation to a geographical scope in those years. They believed global economy's development was not a sequential process where national markets enter international markets, but rather spread their processes. They described the idea as:*"take an ultimate consumable item and trace back the set of inputs that culminated in this item—the prior transformations, the raw materials, the transportation mechanisms, the labor input into each of the material processes, the food inputs into the labor. This linked set of processes we call a commodity chain*" (Hopkins & Wallerstein 1977, p.128). The main three commodity chain's characterizations are its interest in how the global division and labor integration has evolved over time, its attempt to look over the unequal distributions of rewards—added value—in different stages of a chain, and how the spatial and social configurations are affected by either prosperity or decline in the world economy (Bair 2009).

In 1994, Gereffi and Korzeniewicz published a book based on a contribution of different authors about commodity chain research. Its main output was a beginning of Global value chain analysis which had roots in the world-system tradition but also presented disjuncture from Hopkins & Wallerstein's commodity chain. As the authors outlined, their GCC framework: "a*llows us to pose questions about contemporary development issues that are not easily handled by previous paradigms, and permits us to more adequately forge the macro-micro links between processes that are generally assumed to be discreetly contained within global, national, and local units of analysis"* (Gereffi & Korzeniewicz 1994, p.2). In the same publication, the authors determined three dimensions of GCC: an input-output structure, a geographical configuration, and a governance structure. The first analyzes the process from raw materials till the end product and the third dimension describes the process how firms—chain drivers—apportion the created value among the different chain phases. In addition, it also focuses on the way those firms exert control over other participants in the chain. Later Gereffi added a fourth dimension, which defines chain's institutional context— "rules of the game". The two main differences between the GCC and the world-system's commodity chain are that GCC focuses more on the firms that lead the chain and organize international networks, and secondly, it has a different interest in analyzing, especially later with more policy-oriented work (Bair 2009).

According to Gereffi et al. (2005), GCC bounded the global organization of industries and value-added chain and emphasized chain organizer—buyer-driven commodity chain—, where end buyers—e.g. retailers and brand marketers—form and drive the chain processes. Nevertheless, GCC proved to be very useful in development research, that struggled to find a proper paradigm to analyze countries in the global South, that shifted to export-oriented industrialization strategies (Bair 2009).

In the beginning of this century, scholars changed the term "commodity chain" with "value-chain" as it better embodies the variety of products, especially those that cannot be understood as a commodity (Gibbon & Ponte 2005). However, others explained the emergence of GVC as upgrading GCC with governance agenda and the transaction cost theory (Gereffi et al. 2005).

This chapter provided an overview of Global Value Chain origin, starting with the beginning of a chain-research approach in the second half of the previous century. Scholars came with different chain variations, mainly divided into agricultural—*Commodity System Analysis, System of Provision and The Filière approach*—or manufacturing—*Global*

Production Network, International Production Networks and Supply Chain Management. With progressed globalization, new situations in world trade emerged, therefore researchers needed a new paradigm in order to proper analyze them. They found a solution in Global Commodity Chain, which later transformed into Global Value Chain.

4.2 Global Value Chain analysis

As presented in the previous chapter, GVC originate from The Commodity Chain. More recently, the GVC concept has been used for analyzing different aspects of chain coordination and governance (Neilson 2008). Nowadays, there are two main lines of scholars researching GVC—the internationalists and the industrialists. The main representatives of the *internationalists* are professor Gereffi from Duke University, professor Kaplinsky from The Open University in Essex and the researcher Gibbon from the Danish Institute for International Studies (Meshkova & Moiseichev 2016). Their macro level approach covers both levels of analysis and policies, and the main focus is on chain's governance and its upgrading for developing countries (Table 3).

Table 3: Different GVC schools

	Internationalists	**Industrialists**
Main focus	GVC's governance and upgrading mainly in developing countries.	GVC's governance and upgrading mainly in developing countries.
Methodology	Macro approach Industry level data/trade	Micro approach Case studies, Qualitative data
Policy focus	International division of labor, role of bilateral/multilateral trade agreements, FDI	Competitiveness of clusters, local and cluster development policies
Theoretical background	International economics, political economy, TNC theories	Industry studies, local development, cluster studies

Source: Adapted from Morrison et al. (2008, p.44)

The key scholars of *industrialists* are Humphrey and Schmitz from the Institute for Development Studies of the University of Sussex. As seen from the Figure 3, contrary to above mentioned *internationalists,* they investigate Global Value Chain from a micro perspective by using case studies and qualitative methods. Nonetheless, they share the same focus of research, therefore both lines supplement each other (Meshkova & Moiseichev 2016).

The GVC studies differentiate from more conventional industry studies, which see developing countries as better in the primary sector, and developed countries in secondary and value-added traded services sector. In the industry—secondary—sector, conventional studies mostly emphasized on individual sectors (e.g. electronics, food processing) and in a national context, therefore the focus was on the growth, gross output, trade results etc. Contrary, GVC concentrates more on income distribution—rents—and what defines its distribution (Kaplinsky 2004).

Kaplinsky (2004) provided several examples of how GVC's studies differentiate from others, starting with the analysis of rent dynamics, which go beyond sector and consider different phases of it—e.g. in forestry the high added value is the genetics of seed and not in an individual agricultural branch. Another example is GVC's possibility to identify rent-rich activities, which helps to understand appropriation of the returns. When it comes to available data from different sectors, it is hard to interpret the important indicators—e.g. output, sales and costs—of different phases. Therefore, it is difficult to compare in details the same branch in different countries, except by using the GVC analysis. GVC is also able to analyze the dynamic nature of rents that are caused in the global perspective and have an influence on national levels, and last but not least, GVC can explain the determinants of firm-size distribution within the value-chain, that was not able with studies of market structures (Kaplinsky 2004).

The GVC is affected by different factors, coming from different levels, therefore value chains should be analyzed from various levels, starting with the global, followed by macro, meso and micro level. The span of a study begins analyzing the whole value chain in the global level and it ends by analyzing the small actor in a chain at the micro level. When the focus of the study is at the national or regional level, the study is conducted on macro or meso level, respectively. (Dijk & Trienekens 2012).

4.2.1 GVC as an analytical tool

At its simple version GVC provides a heuristic framework—description of the chain and how it works. In order to look deeply, scholars developed a more analytical approach that allows an in-detail understanding of a global income distribution and to identify different policies for lowering inequality (Kaplinsky & Morris 2001). In the next sub-chapters, three key elements for GVC analysis are presented.

Barriers and rents

With internationalization and later globalization of production, different activities—e.g. development, raw material collection, half-product production, assembly, sale etc.—were spread across the world in order to optimize the production. Different activities require different knowledge and inputs, therefore more work intensive activities moved to developing countries and on the other side activities such as development, design, sale etc. stayed in developed markets. Furthermore, different activities gain different values—rents. The parallel could be made to Schumpeter's surplus, which is created by some new combination of resources—innovation—and presents the difference between earnings and costs (Andersen 2011).

Dijk and Trienekens (2012) indicated five different categories of rents: trade, technological, organizational, relational and branding. The GVCs differentiate regarding the type of products or services, hence the height of rents is defined according to demand for it. Scholars provided an example of a study by Nadvi (2004) that showed expanding of the vegetable sector in East Africa did not equally increase the production of high-value added vegetables on one hand and lower the poverty on the other. Contrary, on the top of the value chain of food or coffee the rents are much bigger. For example, at the end of the previous century, cost of a cup of coffee offered by coffee specialty stores in developed countries presented only 4 percent of the price, thus had high rents—added value (Dijk & Trienekens 2012).

4.2.2 GVC governance

The paragraphs above presented how rents differ across the chain and to understand why some actors have to contribute for lower rents, the focus has to move towards value chain governance. It is crucial for the GVC analysis and it defines the nature of the relationship between actors in the chain and their potential development. Moreover, to have an operating value-chain, there should be some degree of governance at every stage in the chain (Holste 2015). The next few sections will focus on three groups of governance, starting with Gerreffi's (1999) governance as driving, followed by the group of extended models (Gereffi et al. 2005) and governance relationship to the quality.

Buyer-driven vs Producer-driven chains

In his early research, Gereffi (1999) distinguishes between two types of commodity chain—later GVC—networks. One is **buyer-driven**, where large branded retailers and manufacturers control decentralized production abroad, often in developing countries. The author gave an example of labor intensive industries, such as consumer electronics, footwear, textile etc. In those, contractors in developing countries produce specified finished goods for a leading actor, who prior develop and later promote them in domestic countries. These industries are highly competitive and leading firms are usually local, but their production network is spread globally. They make profit by innovating and differentiating themselves—branding—from other and not by an economy of scale. Their tied connections across the chain allows them to gain *relational rents,* brand diversification enables *brand name rents* and potential protectionist policies get them *trade-policy rents.*

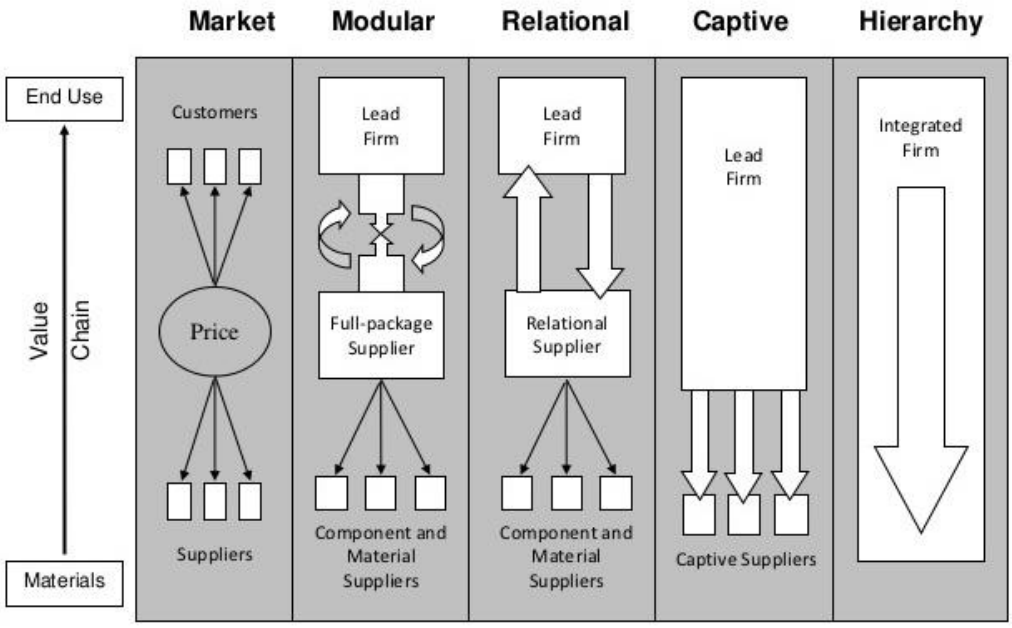
Another type is **producer-driven**, where big manufacturers control the chain upward and downward. Examples could be found in industries such as the automobile, aircraft, computers etc. and are characterized as capital and technology intense industries. By using the control over the value-chain, the demand is fulfilled with mass production that allows them to earn profit. Leading firms operate in oligopoly with a bit higher entry barriers, which allows them to collect *technology* and *organizational rents* (Gereffi 1999).

Following researches on horticulture industry, conducted by (Dolan & Humphrey 2000) and (Schmitz & Knorringa 2000), emphasized on buyers who have high control over the chain, albeit not owning the production—retailers and traders (Gereffi et al. 2005). On these basis, Humphrey and Schmitz (Humphrey & Schmitz 2000) went further and defined four types of governance, starting with Arm's length market relations, Network, Quasi-hierarchy and last but not least Hierarchy. In these years, scholars analyzed GVC's in different industries and duo to their different characteristics, new forms emerged.

The 5 Models of Governance structres

A few years later, Gereffi, Humprey and Sturgeon (Gereffi et al. 2005) introduced five different models of governance structure typology (Figure 2) that gives a dynamic view on GVC's governance.

Figure 2: GVC governance types



Source: Adapted from (Gereffi et al. 2005, p.89)

Typology implements Gereffi's governance as driving structures and brings together scholar of different thoughts to define next five structures (Taglioni & Winkler 2016, pp.158–159):

- Market structure

has simple transactions between the actors. Products are easily specified and suppliers do not need any buyers input. Consequently, the costs for switching to new partners are low. The leading power is kept by the market and not by either of chain ends.

- Modular structure

has complex transactions, which are easy to codify and this allows suppliers to take full responsibility to produce products for buyers, in this case leading firms. Similar to the previous structure, the switching costs remain low, but it requires more complex inter-firm interactions.

- Relational structure

requires a strong interaction between suppliers and buyers to transmit complex and hardly codified information about the products. This cooperation relies on trust and long

partnerships, although buyers remain a leading actor. As partnerships are more complex, the switching costs are higher.

- Captive structure

contains relationships between one or few buyers and many small suppliers, which allow a leading buyer to have great power and control over suppliers. However, the leading actor benefits by suppliers upgrading, as this improves the value chain.

- Hierarchy structure

exists in a fully integrated vertical value chain inside the firm that produce uncodified and complex products. Therefore, different steps and processes cannot be outsourced, but rather kept in house.

In reality, chains are mixtures of different governance forms and they change over time. The evolving is a result of a change in the next three factors: the complexity of information and required knowledge for transaction, information's degree of codification, and suppliers' capabilities in GVC. These factors allow suppliers to upgrade their position in the value chain and consequently influence the rent distribution (Holste 2015).

Governance and quality

Leading firms use different tools to control the GVC and some of these are standards, codifications and certifications. In other words, by defining a desired quality and product characteristics, they govern the chain and the actors' memberships. Moreover, in some cases they can control quality information on different steps in a chain. Ponte & Gibbon (2005) used Convention theory—CT—to define the role of quality in GVC's governance and its value at different points in it.

According to Marescotti (2000, p.105) the convention theory defines a convention as: *"a coordination mechanism that emerges to collectively resolve a situation that could not be done exclusively through an individual decision"* and the quality as:" *an endogenous social construction that contributes to coordinating the actors' activities, to the same extent as other conventions.*" Rather than defining quality of the exchange good, it is defined as procedure—qualification convention—between the actors and their rules of the game in the chain. Conventionalists formed five different co-ordinations between actors that defines the quality: market, domestic, civic, industrial and opinion.

Ponte & Gibbon (2005) used the CT to re-conceptualize governance through a buyer-driven perspective and by linking both approaches, drew a series of parallels between the two

frameworks. The authors conducted a study on the coffee sector and formed a table showing how the conventional theory and GVC characterize three different coffee products—mainstream, fair trade and specialty coffee.

The mainstream coffee is governed by buyers who through the international wholesalers set basic standards of quality and that quality is not presented to consumers. Therefore, the quality conventions happen between the industry and market. Fare trade or organic coffee addresses consumers from the environmental and social perspective—welfare—, thus more information about quality and producers has to be provided. Apart from the coffee itself, consumers pay an additional margin for development of the origin country. NGOs have an important role and buyers are becoming important drivers of the chain. Third—specialty coffee—relies on strong interactions between farmers and usually directly to roasters in developed countries without different middlemen.

Table 4: Linkages between CT and GVC

Quality convention CT	**Organizing principle CT**	**Quality related mechanism GVC**	**Type of "lead firm" and degree of drivenness GVC**	**Mode of governance GVC**	**Example**
Industrial	Productivity	Influence on setting 'content' of quality and standardization or codification; codification of production techniques and (branded) products into a few broad standards	Retailers (High)	Buyer-driven	Mainstream coffee
Market	Competitiveness				
Civic	Welfare	Capacity to match 'civil society' demands in terms of minimum socio-economic and environmental standards	Marketers of 'ethical' Products, Civil society Groups (Medium)	Moving towards buyer-driven	Fair trade, organic and other 'sustainable' coffee
Domestic	Loyalty	Capacity to develop trust through repeated interactions	Producer groups under appellation systems (Low)	Producer-driven, but often not driven at all	Specialty coffee

Source: (Ponte & Gibbon 2005, p.19)

The roasters, who in most cases also do marketing and sales activities, try to create a story behind the product and address coffee enthusiasts that are prepared to pay more for better quality. Moreover, quality and uniqueness are key reasons to purchase specialty coffee. In

this chain, producers have a stronger role, albeit the loyalty and direct relationship has stronger role as drivers (Ponte & Gibbon 2005).

4.2.3 GVC upgrading

In regard of upgrading, different schools of thoughts approach this from different perspectives. In one way, the analysis could be focused on a specific actor—firm—in the chain and its ability to improve its products' quality, optimize the processes, and in that way, increase competitiveness. Porter (1990, p.74) describes it as:" Companies *achieve competitive advantage through act of innovation. They approach innovation in its broadest sense, including both new technologies and new ways of doing things*". Contrary to Porter, scholars in GVC use a holistic perspective and they focus on a group of firms connected in the chain. However, the parallels between Porter's view on upgrading could be taken towards Kaplinsky & Morris (2001) and later Giuliani et al. (2005), who defined the increase of added value as upgrading as innovation and by reviewing different scholars—(Humphrey & Schmitz 2000; Gereffi 1999)— formed four groups of upgrading:

- Process upgrading

  is optimizing the production process by more efficiently transforming inputs into outputs. This could be achieved by using better technological solutions or by improving the production system.

- Product upgrading

  is improving and adding value to products in order to offer better products as competitors. Kaplinsky & Morris (2001) also included the change in product development within individual links and between different chain links.

- Functional upgrading

  is taking over new activity in the value chain that has higher added value than those it had before. As new activity gives better value, old ones could be abandoned.

- Intersectoral upgrading

  stands for moving from one sector's chain into another—with higher value added—and using competences and knowledge from the old operations.

In all four cases, the upgrading stands for improving the actor's positions and moving from low towards processes with high added value. Giuliani et al. (2005, p.552) defined this as:"

…upgrading within a value chain implies going up on the value ladder, moving away from activities in which competition is of the "low road" type and entry barriers are low."

A bit different view than the other scholars, who imagined GVC horizontally, gave a pattern of value added in the shape of a smiling curve. They focused on a geographical location of different activities in the chain. The pattern showed that activities such as development and design give high value and is done in the developed world. Manufacturing and standardized services take place in the developing world with low added value. Finally, the processes—marketing, advertising, sale—move back to the developed world with higher value (Mudambi 2008). This view gives more attention to location and works as a tool for companies when deciding where to move manufacturing in order to optimize their activities. Therefore, it is not so implacable for producers in agriculture, where the location should meet strict requirements to grow a specific commodity.

In global economic progress, emerging of new markets and rising competition on every level of the chain, it is not a question whether a firm or group—e.g. farmers in developing countries—should upgrade but rather how. Actors must improve in order to maintain their position and not allow the competitors to overtake their business. Scholars agreed the most successful ways are by upgrading the product, process or functionality (Cattaneo et al. 2010; Kaplinsky 2000; Giuliani et al. 2005), moreover, functional upgrading increases the barriers for latecomers, thus the effect on competitiveness last longer. This goes along with (Gereffi 1999; Humphrey 2004) a firm's transformation in developing countries starting from an original equipment assembling—OEA—followed by an original equipment-manufacturing—OEM—then to own design manufacturer—ODM—and finally own brand manufacturing—OBM.

4.2.4 Upgrading in Agricultural Value chain

The global demand for food is constantly increasing as a result of the rising population and urbanization. Consequently, developing countries are becoming the main food suppliers and by using labor and land as their comparative advantage, new possibilities for upgrading in the GVC emerge. In order to fill the demand gap, they aim to increase the export, especially in high-value agricultural subsectors—e.g. vegetables, fruits, flowers,

processed food, coffee. Moreover, these opportunities were also sensed by different organizations that started to allocate their activities and investments into developing regions (Bamber, Fernandez-Stark, et al. 2014).

Despite the increasing demand, many developing countries or groups of actors cannot join the GVC. Bamber et al. (2014) characterized five groups of factors that affect their competitiveness (Appendix 1). The first two are Productive capacities—Human capital and Standards & Certifications. Human capital refers to a need for a large low-paid workforce, and high educated, trained and experienced managers to establish new processes for upgrading, such us packaging and processing. The end-markets in developed countries require from producers to meet high standards and certificates and to functional upgrade. The parallel to getting certificates, producing countries have to established proper inspection procedures and regulatory capacities.

The third factor is infrastructure, starting with local roads and ending with good ports and airports connections. Better infrastructure decreases travel time, lower transportation costs and enable exporting goods that quality depends on transportation time. The Institutionalization factors consist of the need for R&D investments, certified laboratories and local supply base. Producers from the countries that lack those factors have to use foreign institutions, which put them into disadvantage. The last but not least, significant factor is business environment, focusing especially on the access to finances needed to invest and modernize the production (Bamber, Fernandez-Stark, et al. 2014).

4.2.5 Quality and Upgrading

In the section 'GVC and Upgrading', the relation between governance of the coffee GVC and quality were defined using the convention theory. By focusing on upgrading, Daviron & Ponte (2005) distinguished three types of qualities and their place in the GVC. First one is **Material quality** and authors claimed that many developing countries could only produce and export green coffee without adding any additional value. This quality can be measured and defined by some standardized description and used in wholesale activities. Therefore, four agreements are needed: list of measurable attributes, technique of the measurement process, defined grading system, and grades' names. In the global trade, standardization helps to get interchangeability working and in that way actors are guaranteed the products meet the demand. This type of quality is important in producing stages and other that follow till the international market, where the demand and supply define the price on the market stock exchange.

The second is **Symbolic coffee quality**, which consists of coffee types, geographical indications and special brand labels. Contrary to the material quality, symbolic cannot be measured and objectively defined. An important part of this quality is reputation and is one of the factors deciding either consumers will buy it or not. It could be gained via trademarks that mainly focus on the roaster and it require some legal framework. The sustainability label, one of those labels emerged few decades ago as Fair-trade coffee, is based on a social agreement and does not have legal definition. The geographical indications of origin—IGO—give consumer knowledge about the producer's location and it is not promoting roaster's brand but rather a country. E.g. Kenyan Highland AA coffee is well-known as one of the finest and special Arabica coffees. Symbolic quality took place higher on the value chain and it is maintained either by countries' institutions, international institutions or roasters. The third quality is **In-person service** and takes place, where the highest value is added. This could for example be in bars, coffee shops, restaurants and presents the immaterial dimension. With other words, the focus is more on how and not what is served (Daviron & Ponte 2005).

4.2.6 Inclusive upgrading

Looking from the national level perspective and upgrading in developing countries, economic upgrading is not enough. According to Sen (1999), development should consist of different freedoms—e.g. political, economic, social—and one can stimulate another. Therefore, the GVC actors should look beyond pure economic benefits but also to enable every geographic location inside GVC to prosper. Looking on a firm level, Barrientos et al. (2011) researched why economic improvement does not necessarily leads to social improvement. Authors used economic upgrading by Humphrey & Schmitz's (2002)—product, process, functional, intersectoral—and characterize it as embodiment of capital dimensions, and social upgrading as process of increase workers' rights and employment status. Their framework filled a gap between both types of upgrading and provides trajectories for a 'win-win' situation. However, they pointed out that a solution is in designing cross-border interventions that have effects in different countries and help both poor workers and the firms involved (Barrientos et al. 2011). As some studies show positive effects for domestic firms in developing countries involved in GVC, there are burdens for domestic SMEs while integrating themselves in GVC.

This trajectory is not allowing inclusive upgrading but rather leaving small farmers behind, therefore the need for policy regulation is increasing. The role of government is to

design a National System of Innovation, which includes local and regional perspectives, became an important policy. However, the limited power of developing countries in GVC or even wider in global market, should not be neglected. Therefore, the international institutions—e.g. WTO and UN—should use various mechanisms to change the trajectories towards the inclusive upgrading.

5 AGRICULTURAL INNOVATION SYSTEM

The demand for agricultural products is growing exponentially and it is expected to grow in the future corresponding to the growing population of the world. At the same time agriculture sector has to deal with the changing tastes of consumers by introducing different verities of different crops that are more environment friendly and healthier. In this situation, increasing the production and introducing new verities of different crops through innovation is the only viable option. Different types of innovation can help using resources more efficiently and productively, and discovering new uses of natural resources (Andersen et al. 2015)

Innovation system research could be conducted by using two different perspectives defined by Lundvall (2007). The narrow perspective that primarily links innovation directly to science and the broader one that comprises more broadly, learning, innovation and competence building in the economy. The narrow approach maps indicators for national specialization in terms of R&D and science organizations. The broader approach takes into account social institutions, financial systems, education and communication infrastructure. From these perspectives the role of R&D organizations, science and technology, financial and educational institutions and government policies are analyzed. The broad approach is applicable for developing countries, that highly depends on the natural resources (Andersen et al. 2015). In this project, the broad meaning of innovation was taken in account as Kenya's economy still relies on agriculture.

The role of innovation in managing natural resources and agriculture sector is indispensable. Innovation brings advances in science, technology and engineering, useful for agricultures and natural resources, helps leapfrogging in genetic technologies and through innovation an entire system can be created around agriculture – Agricultural Innovation System. Through an affective agricultural innovation system, a conducive environment can be created that promotes interactions between government, farmers, educational institutes, private sector and the society (Juma 2015).

According to Fagerberg et al. (2010); there are numerous sources of learning and innovation for bringing minor and major changes with different levels of sophistications related

to all type of activities and sectors. They also proved that innovation is common in developing countries and it leads to productivity increases in almost the same ways as in high income countries. Based on above discussion the literature on innovation theories is taken into account. Different theories will be used that discuss the role of innovation in agricultural development and the case will be analyzed based on the theories in order to devise best practices and recommendations.

Government, private sector, universities and research institutions constitute a larger system for knowledge assimilation and interaction in pursuit of broad common goals for agricultural innovation. Together these actors with varied strengths lay the foundation of agricultural innovation system (Fagerberg 2004). The agricultural innovation system in its broad perspective takes into account the key actors that facilitate farmers to access technologies. As linkages are most effective when recipient industries are competent and they can make quality demands from enabling industries, same rule is applied on a micro level to farmers in the innovation system. Agricultural innovation system works on a demand based approach to agricultural R&D where public institutions play a role of technology producers and farmers as passive users (Adeoti et al. 2010). Moreover, the agricultural innovation system takes agricultural R&D as an interactive process between farmers and public laboratories. Farmers' active participation and understanding of the new technologies is an opportunity for a participatory and multi-stakeholders approach to identify issues for agricultural R&D. Thus, if farmers have an understanding of the new technologies and they actively participate in the technological development, it can result in high quality developments (Adeoti & Olubamiwa 2009).

Innovation capacity development in agriculture also encourages networking of scientific actors around research themes such as biotechnology and networking of rural actors around development themes like dryland agriculture. Links between these networks of scientists and rural actors promotes research in rural innovation. It is argued that efforts taken to unite research-led and community-based capacity could cost low, helps to meet the needs of poor and achieve high returns. Thereby agricultural innovation system lays an emphasis on the formation and coordination of networks that consist of scientists, researchers and farmers from the community. It can help in introducing innovative agricultural activities that directly meet the demands of farmers (Juma, 2015).

Literature on agricultural innovation and global value chain is reviewed in a way that incorporates all the stakeholders in agricultural innovation system and global value chain. Scrutinizing Kenyan coffee sector according to theories and examples used in literature review will result to critically evaluate the sector.

5.1.1 Innovation through linkages in agricultural sector

According to Andersen et al. (2015), innovation policy combined with trade and industrial policies helps establishing linkages that reduce barriers for domestic firms that aim development of the production of natural resource commodities. Linkages provide technological opportunities to the user needs that materialize the cumulative process of innovation. Linkages create interdependence between users and producers in the innovation process. Linkages are considered as a mean for connecting natural resource intensive activities with other activities for strengthening of production and export of natural resource commodities. There are two types of linkages – backward linkages and forward linkages. In backward linkages, natural resource sector stimulates other sectors through the demand for means of production and other inputs. The other sectors are mainly producing machinery and services including demand for science and skills involving knowledge institutions such as universities as suppliers. Forward linkages on the other hand involve the establishment of production units that add value to the natural resource commodities. New refineries that can transform agricultural products into processed food are examples of forward linkages. The concept of linkages is not merely based on market transactions between users and producers but it also incorporates exchange of information, knowledge sharing and other qualitative items. The quantity and quality of linkages have also implications for innovation. As quantity implies, it refers to the number of linkages and quality refers to the content of linkages. Moreover, linkages resulting in learning, innovation and competence building activities are referred as 'high quality linkages' conversely low-quality linkages do not facilitate close contact between users and producers. Hence, in order to deepen the knowledge intensity of linkages for the innovation process, their quality should be enhanced.

Robertson et al. (2003) define the roles of different industries that can be applied to user-producer interaction in linkage dynamics and that has implications for innovation in the natural resource based industries. According to them, industries can be viewed as either 'receptive industries' or 'enabling industries'. Enabling industries are small in size, these are high-tech and provide learning and innovation opportunities to other industries. Recipient industries on the other hand are less innovative and they just use outcomes of enabling industry in form of efficiency enhancing products or processes.

Companies in natural resource intensive industries belong to receptive industries and they have to rely on their supplier industries as they often belong to enabling industries. In the

innovation process, primary role is played by the receptive industries as enabling industries often to innovate when they collaborate with and get requests from receptive industries. The demand posed by receptive industries pave the way for profitable investments in innovation. Enabling industries are also considered as an agglomeration of suppliers that play an important role in overcoming knowledge barriers in natural resource intensive industries. Thus, high quality linkages between enabling and receptive industries play an important role for the emergence and application of innovation in natural resource intensive industries. In other words, low tech natural resource intensive industries have a demand for complex goods and that demand influences the direction of innovation in enabling industries. Ultimately recipient industries are leveraged by the innovative activities taking place in the enabling industries. From this perspective, it is important for recipient industries to establish high quality linkages with enabling industries in order to get innovative inputs (Andersen et al. 2015).

As mentioned above, that high quality linkages result in learning, innovation and competence building activities of the actors involved. In this case, natural resource producers can achieve learning, innovation and competence building through high quality linkages. These linkages also result in cost reduction, product enhancement and mitigating environmental spillovers. In this regard, high quality linkages between firms, universities, and R&D organizations can also affect learning, innovation and competence building for natural resource intensive industries. These organizations engage in different forms of interaction with natural resource intensive industries through high quality linkages to enhance productivity and innovation. Hence, receptive industries should establish high quality linkages with producers of innovative inputs such as other firms, universities, and research and training organizations. According to Larsen et al. (2009), agents such as universities, firms and other organizations that can tap into the stock of global knowledge have the ability to adapt knowledge to local needs and create new technology and products. Linkages between these entities form an agricultural innovation system approach should be created. The dynamics of agricultural innovation system approach are discussed later and implications for innovation in African agriculture are derived.

As far as the quantity of linkages is concerned, that should be raised to realize the innovation potential of the whole economy. One of the characteristics of innovation is that it arises from existing pieces of knowledge and it generates novelty and diversity. Thus, more diverse sources of knowledge can result in strengthening of innovation potential. Diversity seen from the linkages perspective also leads to a larger potential for new linkages and for

innovation. Raising the quantity of linkages means; more suppliers, users and producers getting involved in the emergence of innovation to realize the innovation potential of the whole economy (Andersen et al. 2015).

Andersen et al. (2015), further contend that quantity and quality of linkages deteriorate over time. It is an indication that time is not a measure to unfold linkage dynamics and supportive activities are required to strengthen quantity and quality of the linkages over time. The reason for the deterioration of linkages over time is considered knowledge gaps among the actors involved in linkages. Supportive policies can play a role here in order to close the knowledge gaps. Different natural resource intensive industries and their activities differ in terms of technological complexity. Targeting the areas where technology and skill gaps are limited can be an affective measure to overcome the problems in a shorter period. By closing the knowledge gaps receptive industries can be in a better position to maximize the utility of innovative and technological supplies from the enabling industries. Closing the knowledge gaps also means that innovation also depends on the competence of users—recipient industries—that is as important as competence of producers—enabling industries. Competence of users can lead to high quality of demand resulting in high quality of innovation. In this sense recipient industries from agricultural sector should not merely depend on enabling industries but these should focus on their own competence building as well, so that they can make affective use of innovative products or services supplied by enabling industries.

Coordination between users, producers and other actors also provokes collective actions in agribusiness. These collective actions instigate organizational innovation in markets with higher profit such as dairy or coffee. These formal markets work more effectively by outsourcing to smallholder farmers by larger growers as smallholders can be more organized and supported by higher number of linkages with private sector. As mentioned above; quantity of linkages has implications for innovation, hence smallholders along with other actors can play a positive role in innovation of the agriculture sector (Larsen et al. 2009).

5.1.2 The Role of Universities in Agricultural Innovation

Earlier in this study, it has been established that universities play an important role in agricultural innovation. Here, dynamics of university industry linkages with respect to agricultural innovation are discussed in detail. Universities play a key role in regional innovation systems by providing skilled labor, conducting research in accordance of local

needs, and sharing knowledge and technologies with different stakeholders. Universities help regional innovation systems by creating business incubators and science parks and they also customize their teaching, research and consulting services according to regional needs.

Nigerian agro-food processing industry represents a unique example of university industry collaboration that has been very fruitful for the agricultural sector innovation and research. Universities are driven by demand and they also take into account multi stake holder problem based dimension in collaboration with industry. These modes of collaboration have resulted in innovative outcomes involving diffusion and commercialization of R&D. A successful example of university industry linkages in Nigeria is demonstrated by partnership between University of Agriculture Abeokuta—UNAAB—and Nestle Nigeria. Nestle had a challenge to increase production of high quality soybeans, they employed UNAAB to leverage from the research activities. The university cultivated soybean in northern part of Nigeria besides the southwestern part of Nigeria that was mainly focused by Nestle. The process also improved the welfare of the farmers by involving them in the sustainable soybean production. The collaboration was also supported by International Institute of Tropical Agriculture, Ibadan (Adeoti et al. 2010).
The collaboration was highly successful for agriculture sector in Nigeria. The contribution of farmers helped building capacity for innovation, at the farm level there were significant improvements in the quality of seeds and grains and a new method for growing soybeans was developed. Nestle saved cost and secured regular supplies of high quality soybeans from farmers. The system boosted UNAAB's research activities and northern region of Nigeria emerged as a strong production region for soybeans. On the whole, living standards of people were improved as well as technology adoption in the agricultural sector (Adeoti et al. 2010).

Educational and training institutes can also serve to improve the quality and quantity of skills being produced for different processing firms and farmers by offering special training programs. The skills development in farm management and operation of modern processing machinery could be useful for enhancing output and performance of different actors, like farmers and processing firms (Juma, 2015).

5.1.3 The role of ICT in agricultural innovation

As mentioned above that agents such as universities, firms and other organizations bring new knowledge, technology and products into an economy and together these entities form an agricultural innovation system. In this regard, it could be said that technology is one of the pivotal parts of the agricultural innovation system. The role of technology in innovation is further substantiated by Juma (2015), who asserts that nanotechnology, biotechnology, information and communication technology—ICT—, and geographic information systems—GIS— are the platform for agricultural innovation. These are the technologies through which Africa can support its agenda of development and through which Africa can reach to its full potential. Through these technologies, developing countries expand storage, collection and dissemination of global knowledge, and at the same time, these technologies help developing countries to become capable of scientific research. The dependence of knowledge accumulation on technologies make the later a substantial point of concentration for developing countries in their quest of bringing innovation in natural resource sector.

ICT, GIS, nanotechnology and biotechnology have a great potential in Africa's agricultural sector and these technologies have already created an impact. The same has been evident in other parts of the world. For example, improvements in rice production of China is significantly attributed to technology that brought technical innovation in the agricultural productivity. Approximately 40 percent of the growth in rice production in 13 rice growing provinces of China during the period 1978-1984 was achieved by technology adoption. Subsequently, in the period 1984-1990, all the growth came from technology adoption (Huang & Rozelle 1996).

5.1.4 Genetic technologies and agricultural innovation in developing countries

Genetic technology is relatively new and Africa has the benefit to take advantage of this technology as a late adopter. Africa is blessed with abundance of natural resources, such as sunlight and arable land that can be helpful to reach the full agricultural output. At the same time, developing countries have the advantage of adopting less expensive second-generation biotechnology which multiply the possibilities of differentiation and innovation

in activities related to natural resource intensive industries. One of the uses of biotechnology has been the use of market assisted selection in plant breeding and through biotechnology natural resource producers also form and deepen linkages towards other industries that create new opportunities for diversification and innovation (Andersen et al. 2015). Sub-Saharan Africa has been able to apply second-generation biotechnology on transgenic crops and to leapfrog into more sustainable methods of agricultural production. Here research capacity building in agriculture and other aspects of value chain plays a vital role to adapt biotechnology. As biotechnology is complex and it is a need of current time and it is not indigenous to developing countries, it is also important for developing countries to have a prior strong knowledge in agriculture to take advantage of technological abundance of agricultural biotechnology (Juma, 2015).

The application of modern biotechnology has been critical for seed improvement that allow breeders to analyze genotype information of plants. The demand for environment friendly and healthy products is increasing and some of these demands have been fulfilled by seeds innovations addressing health issues. For example, through seed innovations a new breed of tomatoes has been introduced with high levels of antioxidants that have the capacity to prevent diseases like cancer and heart attack. Genetic engineering technology is also used to transfer gene sequences to a specific plant with the purpose of getting more seed varieties that have additional characteristics, as resistance to herbicide. The growing demand for agricultural products that are at the same time healthier and more environmental friendly put a significant pressure on agricultural products to expand. Improving seeds quality is one of the most economic, efficient and effective ways to enhance crop production and productivity. Thus, improved quality of seeds is very crucial for yield increases. Improved seed varieties are significantly accounted for crops' yield increases. Improvement in seeds is a continuous process due to evolving agro-ecological conditions and it is important to adopt seeds according to changing conditions. It is estimated that Africa and Latin America have the highest potential for the land expansion among developing countries. The land yet to be used for agriculture has not been used due to associated risks of less production, adverse ecological conditions, local weeds and diseases. Innovation in seeds bringing improved quality and local adaptability can be a key factor to make agricultural production economical in new territories (Andersen et al. 2015).

Progress in biotechnology and innovation in seeds open up new avenues of technology for developing countries. For example, the application of biotechnology to seed improvement gives a chance to breeders to obtain and analyze genotype information of plants. Genetic engineering is also a tool that can be used to identify and transfer gene sequences from to a plant with a purpose of getting more seed varieties and making the plants immune to

insects, herbicides and diseases. These innovative opportunities are also creating incentives for massive investments. The application of bioinformatics is also playing the same role. Through bioinformatics, seed companies can get help from computer assisted programs to test the results of genetic modification and hence seed companies don't have to grow every plant in the laboratory or green house. The use of bioinformatics helps to shorten the breeding processes and improves the innovation process (Andersen et al. 2015).

Developing countries from Africa and out of Africa have the potential to use genetic technologies as late adopters. It has been proven that these technologies are very crucial for enhancing productivity and quality of crops. By the application of genetics, the quality of seeds can be improved and plants can be developed that have resistance against diseases and insects. It is therefore a viable option for developing countries to consider these technologies to bring innovation and improvements in agricultural sector.

5.1.5 Access to Finance

According to Larsen et al. (2009), provision of access from private and public sector to finance for agribusiness is a very important aspect of the establishment of enabling environment particularly in rural areas. Limited access to finance, insufficient transport infrastructure and weak education system are considered to be the most common hindrances for innovation. Smallholder farmers in Africa have limited access to financial services, especially in rural areas due to high risks, the uncertainty of collateral and high transaction costs. Studies provide solutions for the limited access to loans, that include expansion of micro credit banks into rural areas and credit schemes offered by agribusiness organizations.

Here it is also important to evaluate whether or not African countries have the capacity to invest in agricultural R&D, technology and individual farmers when a lot of African countries are suffering from poverty and lethal diseases and they are in a state of parsimony. In this regard, Fan et al. (2004) have done a study where they estimated returns to different types of investments in Uganda in terms of agricultural growth and poverty reduction. They observed that investments in agricultural R&D were the most profitable investments in all regions of Uganda. For instance, every shilling spent on Agricultural R&D yielded 20.8 shillings in the western region. In the other three regions—east, north

and central—, every shilling invested in agricultural R&D generated more than 14 shillings of agricultural production. In terms of poverty reduction, investment in Agricultural R&D generated highest returns in the North region of Uganda that is home to poorest people of Uganda. Moreover, a history of public organizations of agricultural technology puts a country in a position to take advantage of new opportunities. In case of Argentina, some firms have gained an important position in the regional markets based on their investment in innovation. Hence, developing countries in Africa or rest of the world should harness technology and spend more for the innovative endeavors in agricultural sector.

5.1.6 Entrepreneurship and agricultural innovation

Entrepreneurship is a driving force for innovation process and it gives rise to innovation enabling environment that sustains the innovation system. Entrepreneurial ventures strengthen institutions, promote learning and create linkages that constitute an innovation system. If entrepreneurs take lead in the innovation process, they can lay foundation for the system of innovation. Rice cluster in Benin represents a classic example of self-organizing innovation system that was jointly created by private entities and the government. Together these entities in Benin introduced a new and improved rice variety 'NERICA'. It was a highly innovative type of rice that could give high yields, quick maturity, resistance to droughts and toxicity. It also contained 25 percent higher protein content then other international varieties and it was more responsive to fertilizers (Dalohoun et al. 2009).

Entrepreneurship played a prime role in the rice innovation in Benin. Different organizations shared entrepreneurial and knowledge sharing roles. The organizations included NGOs, banks, agro-industrial firms and they also received support from government of Benin. International NGOs played their role in sharing specialized knowledge regarding agricultural production, training and research and helped local banks in allocation of finance. Songhai; a socio economic and rural development NGO that promotes minimal inputs with use of local resources was one of the pioneers in the production of rice. Songhai came in contact with regional bank BRS—Banque Régionale de Solidarité—as the bank was looking to fund skilled, competent and innovative economic agents with effective business plans. Songhai fulfilled the requirements which is also an indicator that funds from the banks were to be used for innovative solutions. The role of entrepreneurship in innovation is further reinforced from the fact that another NGO from France named Project d'Appui au Développement Rural de l'Ouémé—PADRO—- worked with the extension

agency, farmer organizations, micro finance establishments and indirectly with ministry of agriculture. The role of micro finance establishments could be asserted as a driving force for farmer organizations that can really benefit from the financial assistance. Farmer organizations can use that finance for R&D and other knowledgeable resources to reap higher profits. In case of NERICA, the entrepreneurship not only supported the whole production and innovation but also spur government interest towards policies for agricultural business development (Juma 2015).

The NERICA case demonstrates some invaluable lessons for agricultural innovation that new technology was implemented through various nongovernmental organizations. The process was started by self-motivating economic entrepreneurs leading to an innovative outcome. As a consequence, private sector pushed the government to introduce new policies that would be conducive for innovation. These conditions lead to more economic opportunities which attract more entrepreneurs that can contribute to economic and technological improvement. This process is referred as a self-organizing system of innovation (Juma 2015).

5.1.7 Role of clusters in local innovation system

According to Gagné et al. (2010), clusters are an important source of innovation. It has been evident that innovation in life sciences has a tendency to cluster around institutions like universities, hospitals and venture capital firms. Juma (2015) extends the same logic to other opportunities for clustering in the agricultural regions. He asserts that clusters interconnect different companies and institutions in a field in a geographic concentration. He also highlights that clusters bring together the industries and entities that are important for competition. The entities include suppliers of inputs, machinery, services and providers of specialized infrastructure.

According to Porter (1998), clusters extend to customers, manufacturers of complementary products, and to companies in related industries, by skills, technologies or common inputs. Moreover, clusters also include universities, think tanks, standard setting agencies, vocational training providers, and trade associations that provide specialized training, education, information, research and technical support. Clusters can carry out co-evolution of all the actors to support the development of a dynamic innovation system that transfer the knowledge into products, services and processes to promote growth. Enterprises and institutions present in the same cluster have a tendency to network together to enable the

flow of knowledge and information. This process forms a dynamic system of self-learning that speeds up innovation. The knowledge circulated in the clusters is of local context that responds to local needs which cannot be easily imitated by rivals.

Cluster theory argue in favor of geographical proximity of different institutes for knowledge development and transfer in the agricultural sector. Geographical proximity of institutes in agricultural sector is important as geographical regions differ based on climate, soil quality, different crops and institutes interact according to local needs. Proximity is also important for informal social interactions for trust building and interpersonal relationships that can enhance the frequency of knowledge, resource and other inputs from institutions and different actors (Juma, 2015).

5.1.8 Infrastructure

Transportation

Adequate infrastructure is considered to be the predecessor for African countries to harness science and innovation, and to be competitive in international markets. Roads play an important role for supporting innovation and development. In some cases, low quality roads have a significant impact on economic development. Roads are important for efficient transportation and logistical networks that allow firms and producers to adopt process and organizational innovations (Juma 2015).

Reliable transportation system plays a critical role for growth and innovation in African agriculture. Besides the most critical element of roads, the transportation system also includes modern rail networks, seaports, and airports that are particularly important for export led agricultural innovation like green beans in Kenya, that wouldn't be possible without an international airport in Nairobi. Together the elements of transportation system create conducive environment for regional and international trade and cross border investments. A sufficient transportation system also provides access for farmers to critical inputs for innovation such as improved genetic material, access to capital, and best farming practices. Many African countries have put infrastructure on high priority as a key element for agricultural development (Juma 2015).

Telecommunication

Telecommunication is becoming increasingly important for agricultural innovation. Especially mobile phones have become the most important tools to transfer and store money,

check market prices, weather information and sharing the best practices. Timely and frequent access to weather, market and farming practices can be considered important, as access to transport infrastructure. Innovation in telecommunication brings change directly to the farm level in a very timely manner as compared to the benefits reaped from the investment in fixed infrastructure that requires comparatively longer time duration. Mobile phone industry is growing at an average annual rate of 50 percent in Africa and the mobile phone ownership has increased from 54 million in 2003 to around 500 million in 2010. The relevance of telecommunication for the agricultural innovation of African countries has never been higher than ever before as mobile users in Africa are increasing at a staggering rate and coffee farmers can also be the beneficiaries of the widespread mobile phone industry (Juma 2015).

The case of e-Choupal in India is an emblematic of the increasingly important role of telecommunications for African agricultural innovation. Through e-Choupal, an Indian private company ITC supplies internet access—through satellite or landlines—and computers to rural areas in India. The setup cost is $3,000 to $6,000 and the annual maintenance cost is as low as $100. Usually, the system is installed at a farmer's home who is held responsible for some operating costs. The whole village is able to take benefit of the system as the farmer is bound by oath to serve the entire community and the farmer in return also gets commission on different transactions. Same system implemented in Kenya can provide vast array of services to coffee farmers through internet. One service point in a village can also serve as a meeting point for different farmers who can most likely share useful knowledge and experiences with each other (Annamalai & Rao 2003).

The following section comprises of the historical background and gradual developments in the coffee sector which are important to understand current dynamics of coffee sector in Kenya. It will also help to understand which areas in Kenyan coffee innovation system and value chain demand more focus. It also helped to understand dynamics of Kenya coffee sector as compared to other big players like Brazil and Vietnam and directed further to explore the opportunities for innovation and higher share in global value chain for stake holders in Kenyan coffee sector. The following section also sheds light on different resource utilization practices for coffee production in different countries that highlighted the need to analyze the role of farmers and technology in the Kenyan coffee sector.

6 THE COFFEE INDUSTRY AT A GLANCE

The Coffee industry was taken into account in this study as coffee significantly helps to understand the relationship between traded commodity and development. The coffee industry also helps to understand the distribution of value along global chains. Almost 90 percent of the coffee is produced in the south and mainly consumed in the North. Coffee has been the most valuable traded commodity after oil for the post second world war period. Many low-income countries with a low share of the global export market depend on coffee for a major proportion of export earnings. Coffee has been the focus of several new forms of regulations under socio-economic labels. Its value chain also represents a highly uneven distribution of income, for example data from 1999/2000 regarding Tanzania-Italy value chain depicts that farmers from Tanzania received only $0.44/kg where the retail price was $2.26 and the biggest proportion of income went to roasters (Daviron & Ponte 2005).

In this section, historical changes in the geography of coffee production, systems of labor and organization of trade that will help to understand the current shape of coffee industry, will be discussed. Most of the international coffee trade consists of green coffee and bulk instant coffee. The final processing of the coffee takes place in the consuming countries where instant coffee is blended and repacked. The green coffee goes through roasting in consuming countries and the trade takes place exclusively in consuming countries. The processing of the coffee takes place in the consuming countries to keep it fresh for longer period of time and due to this pattern of trade exporting countries get only a nominal share of income as the roasters make most of the profit. It is also true that there are relatively few technological and product innovations in the coffee industry once it reaches to consuming countries (USDA 2004).

In the beginning of twentieth century the soluble coffee process was introduced in the US and soluble coffee gained an increased consumption during the second world war where it was added in the US army rations. However, soluble coffee is considered as a low-quality product and the consumption has decreased in most national markets. Coffee industry has seen some major diversifications in the last 25 years based on specialty industry that brought into market ready to drink coffee beverages and coffee chains like Starbucks. With

the expansion of world population and demand for coffee still provide an array of innovative opportunities to coffee producing countries for increased quality production leading to better socio-economic conditions (USDA 2004).

6.1 Need for Coffee Innovation

As it is known, the coffee was consumed mainly in developed countries in the North with the exception of Brazil and Ethiopia among producing countries. Coffee consumption has also increased significantly in Asia, specially Japan and Korea after 1960s. At the same time, different coffee consuming countries have different tastes. For example, Scandinavian countries and Germany prefer Mild Arabica Coffees and Southern Europe prefers Robusta and Hard Arabica coffees that are key components of espresso blends. The US and UK markets prefer lighter blends with a wide range of quality (McClumpha 1988).
Coffee consumption increases as the income rises – opens up a window of high quality coffee for different segments. This has led roasters and retailers to invest in product innovation to increase value added and in capturing new markets in eastern Europe and tea drinking countries of Asia. The innovative practices of roasters and retailers can also urge coffee farmers from the South to increase the production and quality through innovation (Daviron & Ponte 2005).
In the post First World War period, coffee roasters in the US deviated their focus from quality and they started focusing on consistency in price, packaging, flavor and this phenomenon became national in scope. They started using cheaper beans, and reduced roasting times to reduce weight loss. These practices led to lower quality; brand competition was given more importance and the product became of secondary importance. Europe on the other hand, emphasized more on the high coffee standards due to different consumption patterns even after multinationals moved into the industry. On account of these evidences specialty coffee industry emerged that focused on high quality and/or limited availability on the producing side, that also fulfilled the needs of flavoring, packaging and ambience on the consumption side (Lewin et al. 2004). Specialty coffee industry with high quality products has gained its ground in major markets of the world. For example, in 2000, specialty coffee industry contributed with 17 percent green coffee imports and its sales represented 40 percent of the market (Giovannucci 2001). It is estimated that this market is growing by 5-20 percent every year. The emergence of Starbucks also sustained the demand for high quality coffee. Starbucks emphasized on qualities of fine coffees and it also combined the possibility for consumers to choose between different types, origin,

roast and grind. This is how coffee was decommoditized again. Soon, Starbucks gained a widespread recognition among the major consumers of the world.

The growth of coffee shop chains also led to increase in the number of related actors, like specialty roasters. By 1993, coffee shop chains and specialty roasters snatched 12 percent of the market share from the major roasting companies in one of the biggest coffee consuming countries – the US (Dicum et al. 1999). Specialty coffee consumption is growing in other traditional consuming countries as well. Traditional roasters gradually started to respond to this phenomenon. Some industrial suppliers also responded to the growing competition from specialty coffee shops and they started offering high quality coffee roasted on the spot by computerized roasters. Yet, they do not use high quality material; the coffee is of mediocre quality and they pitch their products on fresh roasting and lower prices as compared to the prices of specialty stores. Mainstream roasters can also acquire smaller specialty roasters and coffee shops as a strategy to regain market share. On the other hand, in the course of expansion, Starbucks acquired competing chains, and opened outlets in neighborhoods with traditional coffee shops. According to Starbucks officials, the company pays higher prices to producers and purchases high quality coffee than its competitors (Daviron & Ponte 2005).

6.2 Historical review of the coffee market

In this section, a historical review of the coffee market will be presented with a focus on the different regulations settings and governance. The review starts with a brief coffee history and continuous in the period from the beginning of 20th century till 1937—The Brazilian Monopoly Period—and followed by two others. This review can have learning implications for further analysis.

The coffee was discovered in the ancient Abyssinia—now Ethiopia—and was later with trade spread by Arabs. During the 16th and 17th century coffee reached Europe and in 1683, the first coffeehouse was opened in Venice, Italy. Five decades later the coffee was introduced in Brazil and in the middle of the 18th century, the coffee tree already grew on five continents. Its popularity around the world increased the demand and a coffee industrialization began (Pendergrast 2010). By the end of the 19th century, around three-quarters of the whole world's production came from Brazil, where the number of coffee trees in production increased for 440 percent, from 141 million in 1886 to 620 million in the year 1909 (Holloway 1978).

6.2.1 The Brazilian monopoly period

At the turn of the twentieth century, the international coffee prices decreased to a level, where Brazilian planters needed support to survive (Topik 1979). The world's coffee market was managed—70 percent—by ten major coffee wholesalers and in that way, could control the international coffee price. With increasing production, Brazil wanted to take control of the coffee market from the wholesalers and carried out valorization policy—permanent defense of coffee. The process started in 1906 and it contained the agreements between producers and wholesalers, it set harder rules for export volumes and Brazil started to make stocks of larger amounts of coffee (Daviron & Ponte 2005). Additional to that, government supported planters with a loan that covered 80 percent of the crop value, which stabilized the market and consequently attracted foreign direct investments (Topik 1979).

The introduced policy worked and Brazil took power from wholesalers, however, to control the international coffee price, they had to establish supply-demand balance. This was done by adjusting their export to world's demand and others' competitor's production. The Brazil's interaction to protect their farmers and their export had a positive effect worldwide. Albeit the international price was single-handedly controlled, they provided protection for farmers all over the world (Daviron & Ponte 2005).

Two decades later, after the world recession in 1929, the global demand decreased and it caused Brazilian domestic market to decrease and consequently, the amount of two years' world's coffee consumption had to be destroyed. The years that followed were characterized by different political events, especially the Second World war and countries' preparation to it (Daviron & Ponte 2005). Consequently, the coffee market evolves into more fragmented form.

6.2.2 Fragmentation of the world market

Brazilian valorization scheme lowered the risk for other countries and therefore, it stimulated them to produce more. Unfortunately for Brazil, the policy could not remain and it

had been abandoned in 1937 (Bak 1985). European countries started to favor their colonies by implementing different mechanisms—taxes and quotas—for other countries and this resulted in boosting the production. French e.g. set high quotas and import taxes to achieve doubled price for colonial coffee. Moreover, the production in Francophone Africa increased by a factor of fifteen (Daviron & Ponte 2005).

As other European imperialists followed the French's policy, the Latin-America was losing its dominance in the coffee market in Europe and the situation got even worse with the Second World war. The European market was almost entirely closed; therefore, its main focus became North America. USA limited shipping quotas and this allowed both Brazil and Columbia to increase their export (Bentley 1998). North-South American collaboration resulted in the Inter-American Coffee Agreement and consequently, the prices escalated for 60 percent (Daviron & Ponte 2005).
If the introduction of the valorization policy in the beginning of 20th century enabled Brazil to took the control over the coffee price from the big wholesalers, the political situation in the 50s gave this control to the USA. Additional to change over the price control, the fragmentation period—1930-62—caused the emergence of different state-run institutions and higher domestic regulations.

6.2.3 The International Coffee Agreement (1962-89)

The increasing coffee production continued in the period after the Second World War and with a slower growth in consumption, coffee stocks started to accumulate. Therefore, the coffee price decreased which brought to new discussions and agreements between the countries (Daviron & Ponte 2005). In Brazil, the production of coffee grew extensionally between 1950 and early 1960s from 2,7 million hectares to almost 4,5 million hectares (Baer 2001). The US administration tried to reintroduce pre-war quotas, but the Cuban crises forced them to fairly redistribute value all over the chain to prevent Cuban style revolution spreading across Latin America (Bentley 1998).
The first attempt to regulate the trade between Latin and Central America was signed in Mexico in 1957, and was later renewed to the Latin America Agreement. However, the growing production and export from Africa were not part of these deals, therefore in 1959, they were invited in the establishment of a new worldwide coffee agreement. Three years later the first International coffee agreement—ICA—had been signed between most producing and consuming countries (Daviron & Ponte 2005). US senate confirmed the law in

1965 and in that way, gave away the control over the international prices. On the expense of American consumers, small farmers in Latin America gained and the coffee price stabilized on a higher level. It is worth to mention, that during the history small farmers had high influence over national legislation and elections, therefore politicians often formed different alliances with them (Bentley 1998).

In 1963, the International coffee organization—ICO—was established with the collaboration of United Nations—UN—and it incorporated coffee producers, distributors and consumer nations (ICO 2017). ICO's role in the ICA was to set a target coffee price and to redistribute export quotas among different producers. This target price then worked as a point where quotas were either tightened or relaxed. In practice, if the market price was lower than the target price, quotas were stiffened and when the actual price rose over the target price, the export was freed (Daviron & Ponte 2005).

The ICA's regime relatively successfully controlled the coffee market by (Daviron & Ponte 2005, p.87):

- Giving the consuming countries right to participate in the export quotas negotiations
- Keeping producing countries as valuable market unit
- Convincing Brazil to lower the overall market share based on the worldwide increasing production
- Introducing shared strategy in producing countries for import of substitutes.

For two decades, the ICA kept the coffee market stable, but the combination of various factors—political, trade and social—slowly destabilized the highly-regulated regime and in 1989 it ended. The first factor to mention was the change in the consumers' habits, which started to prefer "ground coffees"—higher share of Arabica—instead of "soluble coffees" that contain more Robusta. This put countries producing Arabica, some of them non-members of the ICA, advantage as they did not respect quota regime. The period of a stable environment for coffee planters, even more, spread this culture and stimulated countries—non-members of ICA—to increase production. The third factor was political, caused by the Cold war that changed the relationship between Latin and North America. Thus, US did not perceive Brazil as a strong actor and these opened the doors to market liberalization (Daviron & Ponte 2005).

In this chapter, three different periods of the coffee market were described. Each of them was characterized by different circumstances and consequently, different regulations. In the first phase, Brazil took an initiative to protect its coffee planters and export by collecting stocks. In this way, Brazil stabilized the international price and provided protection for its and other planters worldwide. Due to the interests for strengthening their colonies, European countries introduced different import regulations, so Latin countries slightly lost this market. On the other hand, African countries increased the production, however, the benefits of this stayed in imperialistic countries. The situation in Latin America was destabilized and the US decided to sign an agreement with them to lower the tensions. In this period, the governance of the value chain had been taken from Brazil and was in hand of the US and imperial European countries—consumers. The stabilized condition in the 2nd period led to overproduction, which resulted in a price drop. Various political, social and market factors brought countries together to sign ICA in 1962 and to an establishment of the International Coffee Organization. Its key role was to regulate the market and distribute the value through the whole chain. In 1989 the ICA was abandoned and market was liberalized, which led to move of stocks from producing to importing countries.

Till now, this chapter presented three different periods of the coffee market, more importantly how different events changed the global value chain and in turn changes in the governance of coffee chain.

Due to the liberalization of coffee market, some other players emerged in the world coffee trade. For instance, Indonesia and Vietnam emerged in late 20th century and they had a very fast and rapid development. Vietnam became the second largest producer of coffee in 1999 with the expansion of coffee cultivation in the Dak Lak province located in the central highlands. The province was subject to a dramatic increase in the area under cultivation that increased by 14 percent every year from the period 1990-2000. Vietnam achieved this target by adding deltaic agricultural system to coffee production (Daviron & Ponte 2005). Brazil and Vietnam have followed different models of expansion with former having the labor extensive expansion and the later promoted the cultivation by relying on mechanized model of cultivation. As a result of these expansions, the African production has been facing a steady decline in production from one third of the global harvest in 1970-4 to 13-14 percent in 2001-4. The export dynamics have followed the same trajectory where African coffee exports have been declining in the world trade. Civil unrest in Angola and Uganda during the period 1980-1990 and ageing of coffee trees in Africa are attributed to low coffee exports from Africa. As most of the coffee is produced in developing countries from South

and decreased share of Africa in the world trade urge this study to be conducted for socio-economic betterment of Africa and for enhancing agricultural innovation system (Daviron & Ponte 2005).

6.3 Labor rights violation

This section first gives an historical overview of the form of labor mobilization from major coffee producers and later present the current labor associated problems. Till the end of eighteenth century, coffee was the second major crop after sugar in terms of number of slave labors. Slave plantation models of coffee take us back to 1780s where the island of Domingue—Haiti—was supplying half of the volume of European consumption with a population of 452,000 slaves (Curtin 1998).

Wading through the history of coffee cultivation in Brazil, an inference can be drawn that Brazil has been at the very heart of slave coffee cultivation after Haiti. At the beginning of nineteenth century coffee became main crop in Brazil and in order to fulfil the labor needs Brazil imported an annual average of 37,000 slaves between 1811 and 1850. The number of slaves available has been one of the competitive advantages of Brazil cultivation and Brazil's coffee production model has predominantly been based on slave labor. By the year 1888 when slave trade was abolished, Brazil was the last country that put an end to slave labor. Following these events, the era of coerced labor emerged that consisted of forced labor and coerced smallholders. These labors were obliging persons-farmers who had to spend a proportion of their time on working government farms and private enterprises (Curtin 1998).

Many other countries also had the existence of coerced mobilization of indigenous labor on large plantations. Particularly European colonies in Africa before the first World War exemplified that system. Forced labor was also pervaded in French colonies of sub-Saharan Africa (Daviron & Ponte 2005). It took several decades to completely dwindle forced labor in Africa by the efforts of African Labor Union, the League of Nations and International Labor Organization.

While an effort of various organizations successfully limited the slavery and coerced labor, the child labor is still widespread in the global coffee sector. Due to the low earning, farmers have to instead of hiring seasonal workers, use the child labor. As the environmental factors highly influence the yield, the number of workers various between the years. Moreover, similar affect comes from the coffee price level, when it is higher, families send their

kids to work instead of school. The study in Brazil showed, that the number of children involved in the working process is 34 percent higher in the coffee regions, than in others and similarly, the number of children enrolled in school is 3 percent lower (Food Empowerment Project 2014).

According to United States Department of Labor's 2015 report, Kenyan government has several programs to tackle the problem of the child labor, especially the worst forms of it. However, despite the programs they made a minimal advancement and still every third child between age of 6 and 14 is involved in child labor. As coffee sector directly and indirectly provides work to almost 10 percent of the Kenyan population, high share of child labor is also present there (DOL 2016).

The above chapter helped to understand the dynamics of the international coffee market. The chapter provided insights on value distribution among different actors from importing and exporting countries. Changing trends in the demand of coffee based on the quality were also observed. Growing demand of high quality coffee around the world became evident from the observation, which instigates the adoption of innovative practices for enhancing coffee quality and production in developing countries. The chapter also shed light on price controlling activities and events and their effect on farmers' earnings. Fragmentation of the world coffee market was also discussed to understand how different producers can co-exist and make profits. In the end of the chapter the coffee sector was analyzed from the labor working violation perspective, which are considered seriously by the specialty coffee retailers. All the factors discussed in the chapter can be useful to understand the international trade. In this regard, this chapter was very insightful to conduct the GVC analysis.

7 GVC ANALYSIS

In this chapter, the global value chain for mainstream coffee will be presented and it will give a comprehensive overview of the market. When the authors searched for a proper framework, the emphasis was to understand who the main actors are and how they can influence the market. Additionally, to understand the reasons for the current situation, different market's fundamentals—e.g. price, consumption—were analyzed and the relationships between them examined. The main expectation from the GVC analysis was to build an understanding of the situation and make a basis for the NSI analysis.

7.1 GVC Framework

This thesis aims to address the possibility of upgrading in the coffee global value chain for developing countries and first, the chain was analyzed. The conducted review of GVC literature pointed out different frameworks, however this project has followed the Six Dimensions of the GVC Analysis' framework (Figure 3) presented in Gereffi & Fernandez-Stark (2016). In the six different dimensions, it analyzes both global and local view on the chain. Through the holistic approach of global industries, the top-down and bottom-up analysis provide description of international elements and an individual country's participation.

Figure 3: Six dimensions of the GVC framework

1. Input-Output Structure of a GVC
2. Geographic scope — GLOBAL
3. Governance structure

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4. Upgrading
5. Local institutional context — LOCAL
6. Industry Stakeholders

Source: Adapted from Gereffi & Fernandez-Stark (2016, p.7)

In the first step, the aim is to identify the main activities and segments that take place in a specific GVC, including the study of value distribution. Additionally, this step includes the analysis of the dynamics and structures of the companies in each defined segment. The geographical scope—2nd step—requires different international data-bases to identify the current situation and potential shifts in the GVC. This thesis used three major data-bases—the ICO, USDA and FAOSTAT databases—to conduct a quantitative analysis of the main coffee market fundamentals.

The third step inspects how and by whom the GVC is controlled and coordinated, mainly focusing on the power of the leading actors. As presented in the literature review, the first two major types of governance mode were defined—buyer or producer driven—and later scholars developed a more elaborated typology of five structures; market, modular, relational, captive and hierarchy. For the purpose of this project, the first typology was used as the coffee sector rather changes the way it is driven than its structure. By conducting a historical overview, the main reasons for the changes were identified.

The fourth step—upgrading—analyzes the potentials for a country or firm upgrading in the value chain by overtaking the activities with higher-value added. By using data from the first three steps, the opportunities could be defined and the chances for using it. Besides the major upgrading types—process, product, functional and chain upgrading—, the thesis looked at inclusive development and how upgrading can make it happen. The fifth and sixth step—Local institution and Stakeholder analysis—were not used in this part of the thesis. These two steps are overlapping with the NSI framework used in the next chapter.

7.2 Operationalization

Before one can proceed with the quantitative analysis, the operationalization should explain how different constructs will be measured. In order to identify potential upgrading opportunities for the developing countries that stagnate in the coffee GVC, the chain has to be analyzed. The understanding of the current structure and trends could enable further identification of Kenya's position in it.

In the beginning, the international coffee price was analyzed as a dependable variable (Appendix 2), to investigate who controls it. The GVC literature normally used basic market fundamentals in similar cases, therefore production, consumption and stocks were used as independent variables. With the aim to find what significantly influence the price, a correlation and a linear regression were used.

Afterwards, the construct—upgrading—from the research question was analyzed. The GVC literature defines upgrading as overtaking the processes that bring higher value. However, there is no direct data available to measure upgrading. The problem appears, as almost every producing country has at least a small share of processes that take place later in the coffee chain. Consequently, the countries were analyzed through their trends and their share in different market fundamentals.

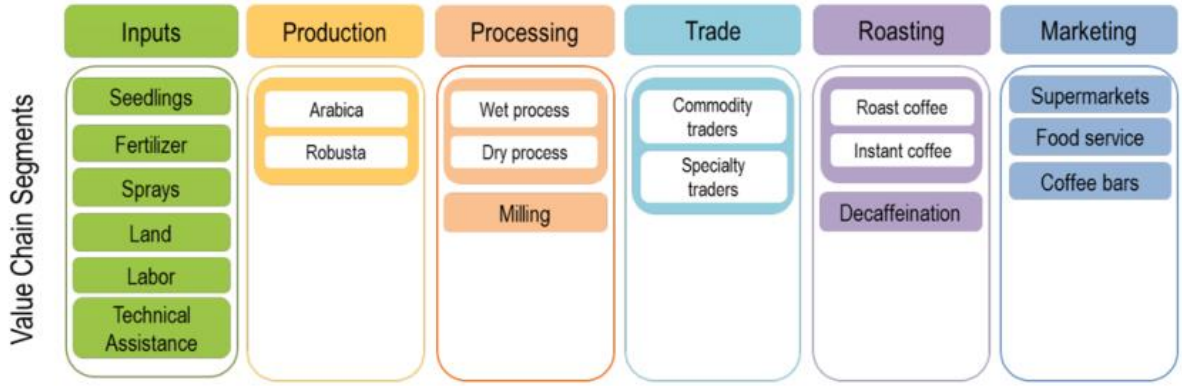
Thus, if the conceptual meaning of upgrading presents taking over the processes, then its operational meaning was analyzed as increasing in production share and domestic consumption. Finally, comparing this with Kenyan statistics, gave an overall understanding of upgrading opportunities in the coffee GVC.

The following sub-chapters contain different steps of the 6-dimensions framework analysis by using above explained operationalization. Their results were the basis for the qualitative research that comes afterwards.

7.3 Step 1: In-put and out-put structures

The first step describes the process from raw material till the final product and in the coffee GVC, six steps are identified. Inputs and Production are done either by small farmers or estates in developing countries. Before the coffee beans are exported, wet and dry processing must be done. The mainstream coffee is sold on the coffee exchange, where domestic and international traders—supply and demand—meet. The roasting and marketing phases are done in developed countries, mainly in the USA and EU. In the Figure 4 bellow, those six steps are filled with segments for the coffee market.

Figure 4: The Coffee GVC



Source: Adapted from Bamber et al. (2014, p.3)

The focus of the thesis is on the actors at the bottom of the value chain—the coffee producers—, therefore, their situation was analyzed and how it was unfolded over last few decades. The crisis affecting the farmers at the turn of the century did not affect the value of coffee-based products in consuming countries (Daviron & Ponte 2005).

Fitter & Kaplinsky (2001) researched how unevenly distributed incomes affects the sustainable growth and who gains rents in the Coffee value chain. They defined 6 stages along the chain and investigated the income distribution among them. In the figure 5 bellow, different scholars' income distribution in the coffee GVC are presented.

The scholars' value distributions presented in the Table 5 were conducted on different markets, with slightly different methodology and in different years. Therefore, the results cannot be totally comparable. Albeit differences, it could be concluded that payments for farmers decreased through the years, both in actual value and proportionally as part of the retail price. High decrease in farmer income is seen from the Table 5, in the middle of the ICA period, they earned US$2.29 per kg of green coffee and this falls between US$1-2 in 1991 and was between US$0.41-0.77 in 2015 and the last column is the price for Kenyan farmers selling on the Nairobi Coffee Exchange. The US$ currency was not calculated to the Net present value, which would show even higher differences.

Table 5: Value distribution

	Stage	1977[1]	1995[2]	2001[3]	2002[4]	2014[5]	2015[6]
		$/kg	$/kg	$/kg	$/kg	$/kg	$/kg
Producing Country	Farm	2.29 (24%)	1-2 (10-21%)	0.68 (4%)	0.31 (7%)	.45-0.73 (3-6)	0.41-0.77 (4-7%)
	Factory	4.32 (46%)	3 (31%)	1.46 (8%)		4.1 (31%)	
	Exporter		3.75 (39%)	1.58 (9%)	0.57 (12%)		4.7 (41%)
Consuming Country	Import Agents	5.42 (58%)	4.7 (49%)	1.68 (9%)	0.66 (14%)		
	Factory		7.5 (78%)	14.35 (80%)	4 (87%)		
	Retail	9.36 (100%)	9.7 (100%)	17.95 (100%)	4.6 (100%)	13.1 EU Average (100%)	11.6 EU average (100%)

Source: Authors

[1] (Talbot 1997, p.67)

[2] (Fitter & Kaplinksy* 2001, p.73)

[3] (Daviron & Ponte 2005, p.210)

[4] (Daviron & Ponte 2005, p.210)

[5] (Kieyah & Lesiyampe 2016, pp.32–33)

[6] (SABC 2016)

The difference between the farmers' payments and the retail price are increasing and the value distribution does not provide an explanation for this. Therefore, the next steps of the analysis were investigating this problem.

7.4 Step 2: Geographic scope

In order to study the increasing pressure on farmers' income, quantitative research was conducted. The starting point was the international coffee price and the factors that influence it. The analysis of prices—ICO indicator prices—before and after the breakdown shows that the prices fall rapidly. If the average price for the last five years of ICA agreement (1984-88) was US$2.95, the new circumstances dropped the price to US$1.58 in 1990 and the fall continued for the next two years by 25 percent to US$1.18 in 1992 (ICO 2017).

Table 6: Average ICO composite prices

Period	Average price US$/kg	Price index
Last 5 years of ICA (1984-1988)	2.95	100
First 5 years after ICA (1990-1994)	1.71	58
First 10 years after ICA (1990-1999)	2.11	71
First 15 years after ICA (1990-2004)	1.81	61
1990-2016	2.29	77

Source: Authors from ICO (2017)

As seen from the Table 6, the coffee price is constantly changing through the years. It's Standard deviation in the period from 1990-2016 is 40.85 (Appendix 3). In order to gain a better understanding of what influences the international coffee price, different variables—production, consumption and stocks—were analyzed. By using Pearson's correlation analysis (Table 7), it can be stated, that there is a strong negative relation (-0.71) between coffee price and stocks in the exporting countries. Comparing these results with the correlation coefficients from the International Coffee Agreement period (Appendix 4) shows that production and consumption used to have even fewer (0.32, 0.45) and stocks slightly stronger correlation (-0.11, -0.76).

Table 7: Pearson's correlation coefficients 1990-2016

	Price	**Production**	**Consumption**	**StockIMPORT**	**StockEXPORT**
Price	1				
Production	0.47	1			
Consumption	0.54	0.80	1		
Stock IMPORT	-0.03	0.69	0.50	1	
Stock EXPORT	-0.71	-0.79	-0.91	-0.44	1

Source: Authors from (ICO 2017; USDA 2017)

The further time-series analysis of the selected coffee market fundamentals (Table 8) shows that stocks in importing countries significantly related to a change in price. A bit less but still a strong relation is seen between stocks in the exporting countries and the coffee price.

The Pearson's correlation coefficients slightly changed between the current period and the ICA period, nevertheless, in both, the stocks have high correlations to price. The most important change in the liberalization process between both periods was the control over the stocks.

Table 8: Linear Regression Analysis

Residuals:				
Min	1Q	Median	3Q	Max
-25.125	-11.858	-7.776	5.924	64.133
Coefficients:				
	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	3.41E+02	9.64E+01	3.54	0.00184 **
Production	5.42E-04	4.58E-04	1.185	0.24874
Consumption	-8.89E-04	5.38E-04	-1.65	0.11308
Stock IMPORT	-4.41E-03	1.45E-03	-3.046	0.00592 **
Stock EXPORT	-3.18E-03	8.12E-04	-3.916	0.00074 ***

Signif. codes:	0 '***'	0.001 '**'	0.01 '*'	
Residual standard error:	23.94 on 22 degrees of freedom			
Multiple R-squared:	0.7095		Adjusted R-squared:	0.6567
F-statistic:	13.43 on 4 and 22 DF		p-value:	1.10E-05

Source: Authors from (ICO 2017; USDA 2017)

Prior 1990, the control over the stocks were in public institutions' domain and the end of ICA gave it to the private sector. These intermediates and wholesalers control the value

chain, they define the quality standards and consequently influence the coffee's market price. According to Daviron & Ponte (2005, p.113), stocks present: *"…the availability of the most immediately mobilizable coffee on the market to respond to a demand increase*" and consequently influences the price. Yet, they argue that the impact varies on the owner or controller over the stocks. They distinguish between the stocks owned by producing country institutions, by roasters and by traders. Only the third can directly fill the increased demand, as on the other hand the stocks owned by roasters are not actively on the market and the one owned by producing countries are absent from the market and therefore their availability is not that certain. From this it could be concluded, that wholesalers who control the stocks in importing countries, have a higher influence on the international coffee price.

Regardless the fact that the global coffee value chain has not been regulated with new policies or agreements on a global level, the market fundamentals—production, consumption and availability—change and this might significantly influence the GVC. In the next few paragraph, these categories will be presented.

7.4.1 Production

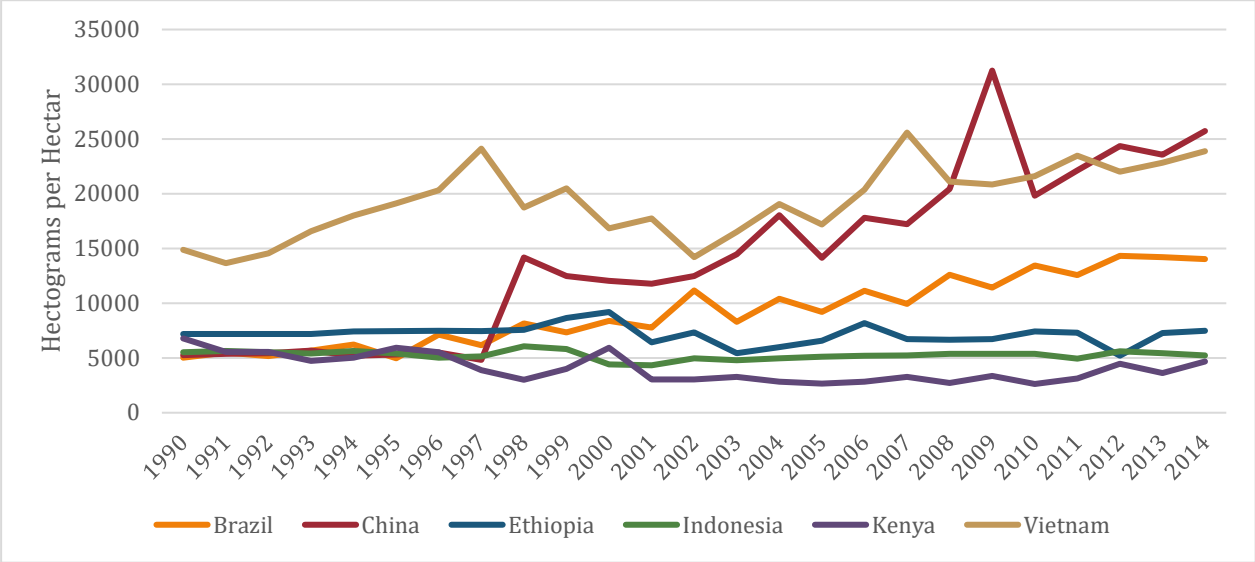
The quantity of the produced coffee varies due to the different factors and the trend in the last period is positive. However, different environmental effects—e.g. droughts and floods—harm the farms and consequently influences the produced quality and quantity. The factors differently influence the production at different locations, therefore the analysis was done on the production data of all coffee varieties combined—e.g. robusta and arabica. In 1990, the world's coffee production was 6 million tons and the top 5 countries—Brazil, Colombia, Indonesia, Mexico and Ethiopia—produced 56 percent of it. In 26 years, the production increased by 56 percent and the top 5 producing countries have a share of 73 percent of total production (USDA 2017).

Vietnam, who did not have any coffee production history and was only the 18th producer in 1990, managed to become the world's second biggest coffee producer. Vietnam's coffee productions costs lay below the global average due to the combination of cheap labor, easy-to-grow Robusta varieties and good growing conditions (Lindsey 2003). Moreover, their efficiency—yield—is far above most of the other countries Figure 5.

Comparison of the production growth for top 25 producers between the ICA period and the current period shows, that they all constantly increased the production during the first period and only 11 countries increased the production in the later period. From this it could be concluded, that the ICA regulation allowed most of the countries to produce and

to grow, as on the other hand, liberalization of the market increased the competition and in most cases big producers became bigger and smaller producers became even smaller. Unstable price forces producers to optimize the process and rather than increasing the quality, lower the production costs. Figure 5 shows the improvement of yield in the last period and indicates that countries that increased their total production, also increased their efficiency. Vietnam, China and Brazil evidently increased their efficiency, while Kenya, Ethiopia and Indonesia stagnated during the selected period.

Figure 5: Coffee yield in selected countries



Source: Authors from FAOSTAT (2017)

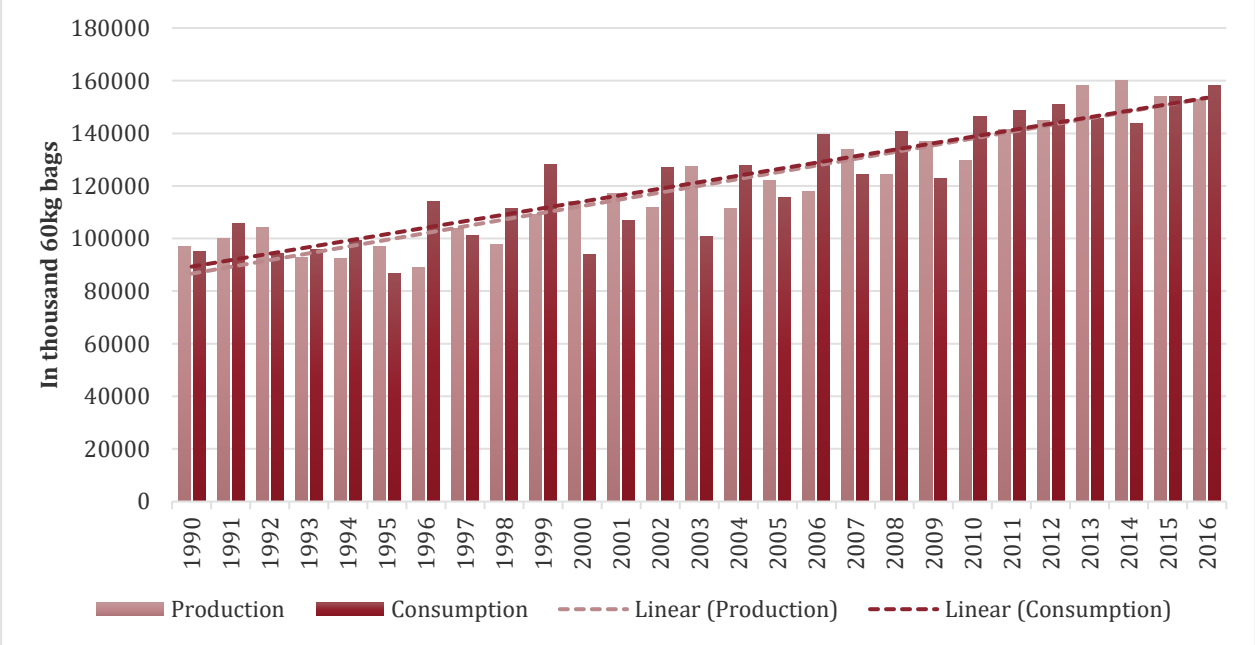
The Kenyan coffee sector was rapidly growing in the ICA period, from 635 in 1962 to 1,960 thousand 60 kg bags in 1989, with an average yearly increase of 6.5 percent. The production peak was made two years earlier, with a production of 2,160 thousand bags. As many other countries with a relatively smaller share in production, the end of regulation and the quotas system also decreased the amount of the total production in Kenya. The unstable earnings for farmers, environmental issues and increasing costs of production decreased the production and in 2016 they produced 750 thousand bags of coffee. This presents 0.5 percent of the world production and does not have any serious impact on the coffee sector (USDA 2017). However, together with some other East African countries Kenya presents an important role in fine quality coffees (Daviron & Ponte 2005). The stagnation in efficiency improvement could be seen from Figure 5 and the big lack between Kenya and countries with high productivity.

7.4.2 Consumption

The world's total coffee consumption in the period of the last 26 years is positive and the average ratio between consumption and production is 99.6. The countries of the European Union are the biggest coffee consumers and together consumed 28 percent of total consumption. Considering EU's population—508 million citizens—(Eurostat 2016), a bit less than seven percent of world's population consume almost one third of the worlds coffee production. If the EU's consumption was increasing during the first ten years after 1990 for almost 1.5 percent per year, the growth stabilized and in the last decade it increased for less than 0.4 percent annually. A bit faster growth was seen in in the USA market—18 percent in the last decade—, but the total consumption growth is mainly driven by other countries. Their increase in the after the ICA period is 117 percent and those markets are becoming more important for retail market sellers. During the same period the major coffee producing countries extensively increased domestic consumption—e.g. Brazil 128 , Indonesia 160% (USDA 2017).

Contrary to big producer, Kenya was unable to promote domestic consumption. In the last few years it reached 50 thousand bags, which still present less than 7 percent of their production. Compared to other countries—e.g. Brazil 37%, Ethiopia 46%—the numbers are very low and presents a big opportunity for the future.

Figure 6: World's coffee production and consumption



Source: Authors after (USDA 2017; ICO 2017)

As stated earlier, production and consumption are increasing with the same trend over the last period. However, due to the different environmental effects, production cannot always cover all the demands, therefore the stocks play an important role. As it is seen from Figure 6, the production and consumption are rarely equal in the same year. The producing countries have their stocks mainly to reduce the environmental factors and at the end of ICA period they had more than 55 million bags of coffee. Liberalization decreased and slowly moved the stocks from exporting into the importing countries (Table 9).

The data in this chapter indicates, that the coffee sector is steadily growing, both by production and consumption. Liberalization increased the competition and pressured the price, which harmed the countries who earlier relied on quotas and regulation and could not adopt to a new market model. The control over stocks shifted from public to private organization and governments lost an important tool to stabilize the market fluctuations. However, there is a market fundamental that is changing and could slowly change the current GVC model.

Table 9: Export and Import stocks

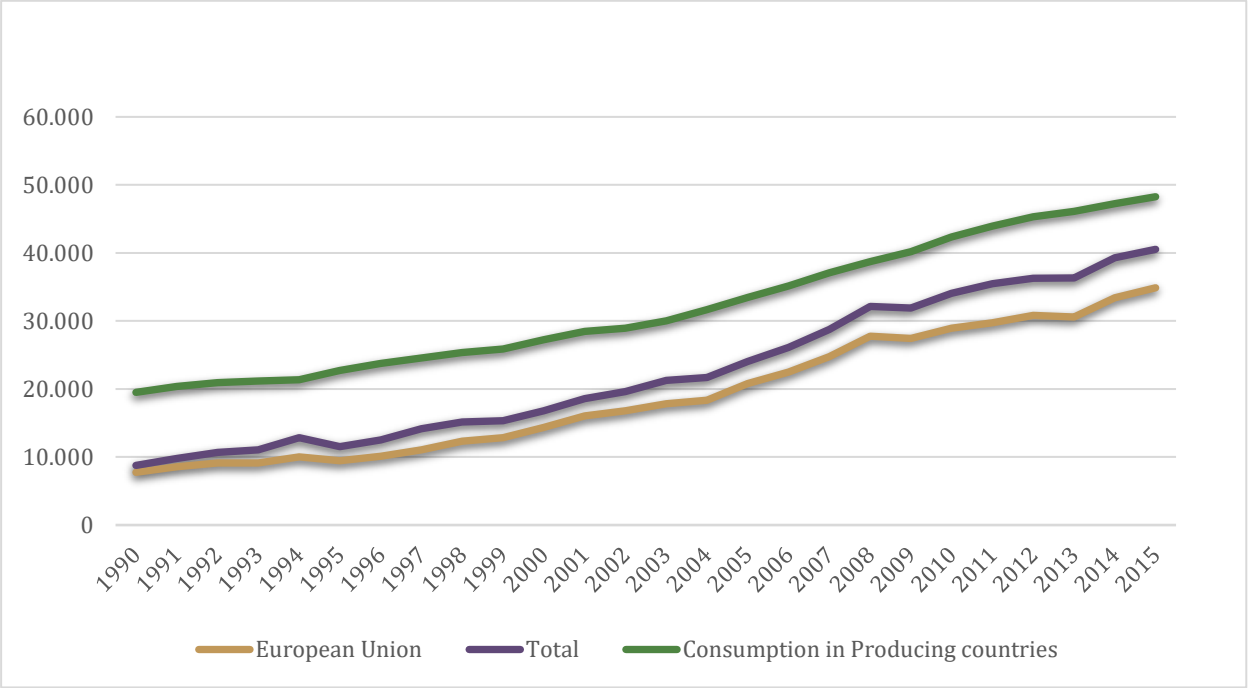
In Thousand 60kg bags	1990	2000	2016
Stocks in exporting countries	55,792	48.311	14.589
Stocks in importing countries	18.052	20.093	23.013
Total stock	73.844	68.404	37.589

Source: (ICO 2017)

With rising consumption, especially in the producing countries, coffee re-export started to increase. The increase in those countries was from 19,509 thousand in 1990 to 48,337 thousand bags in 2016. As producing countries mainly focus on exporting green coffee beans, they have to re-import the finished products from the developed countries.

The similarity in growth between the consumption in developing countries and re-export in developed countries is presented in Figure 7. Big end-product producers—e.g. Nestle, Starbucks—might soon change the standard coffee GVC and by moving part of the production into those markets, to create more Regional or even Local Value chains.

Figure 7: Coffee re-export and consumption



Source: (ICO 2017)

Till this point, the coffee GVC was defined and with the value distribution, the farmers' situation analyzed. Quantitative research indicated what influences the price and how different market fundamentals evolved during the last period. The trend of the domestic consumption is slightly changing the GVC and the next section analyzes the governance of the GVC and how it has changed over the last few periods.

7.4.3 Step 3: Governance

In this step, the governance of the coffee sector GVC has been analyzed, starting with inspecting the characteristics of the value chains in the three coffee sector periods described in chapter 6. The focus is on different governance types in each period and the causes for the changes. Secondly, the situation after the International Coffee Agreement was analyzed. The results from the historical overview over the coffee market could indicate the potential causes for changes in the GVC's future.

Prior to the start of the Brazilian valorization process in 1906, more than two thirds of the coffee markets were managed by a few wholesalers. They controlled the price and as lead actors administered the value chain. Consequently, farmers' earnings did not allow them

to survive and Brazil implemented the *Permanent defense of coffee act* to change the power distribution along the Coffee value chain (Daviron & Ponte 2005). By controlling the export quantity, collecting the stocks and handling relationship between farmers and wholesalers, Brazil overtook the power and position as leading actor. This changed the coffee sector into the producer-driven chain.

The world economy recession in 1929 lowered the demand and as a result the two-year amount of coffee had to be destroyed. Moreover, the European imperial countries started creating their own chains from their African colonies and by introducing different discriminatory policies that prioritized them towards non-colonial coffee. The Latin-American exporting countries were affected by losing access to the European market and were dependent on the USA, who helped them, which resulted in the Inter-American Coffee Agreement. Albeit this increased the price of coffee and improve Latin-American producers, USA took the power over coffee back from Brazil (Daviron & Ponte 2005). The fragmentation period was a result of different economic and political events—e.g. Second World War and World Recession—, which changed the sector back into being buyer-driven and reestablished the USA and European colonial countries as lead actors.
In the coming decades, the increasing production was faster than increasing consumption, which resulted in stock accumulation and consequently, the price decreased. The USA had control over the Latin-American coffee chain, but they had to give it away in order to prevent destabilization in Latin America—after the Cuban crisis. The first attempt was the agreement between Latin and Central America in 1957, but the worlds coffee production was already too fragmented, therefore the need for inclusion of other countries emerged. The International Coffee Agreement was signed by most of the producers and it gave a leading role to the International Coffee Organization (Daviron & Ponte 2005).

Table 10: Coffee GVC structure over time

Period	*Lead actor*	*Governance structure*	*Reason for change*
Prior 20th century	Merchant firms	Buyer-driven value chain	
Brazilian period (1906-37)	Brazilian government (regulation)	Producer-driven value chain	Low coffee price Low earnings for farmers
Fragmentation period (1930-62)	USA and European imperial countries	Buyer-driven value chain	- Decrease in demand - Domestic market protection
ICA period (1962-89)	International Coffee Organization	Producer-driven value chain	- Overproduction - Low prices - Political instability

Source: Adapted from Daviron & Ponte (2005, pp.83–95)

In 1990, the ICA breakdown due to the few factors. Some non-ICO members increased their export as they did not need to respect the quotas. Their coffee was cheaper and roasters in importing countries started a price war by using their coffee beans. Moreover, the consumption preferences changed in favor of ground coffees—mostly Arabica—against soluble coffees—mostly Robusta. As a result of the breakdown, the private trading companies took the control over the stocks from public institutions and moved most of the stocks from producing to importing countries (Daviron & Ponte 2005).
The historical overview gave different reasons for the radical change in GVCs (Table 10). Some were social—protecting farmers' status—, political, economic or driven by changing consumer trends. The GVC analysis showed that current leading actors are big wholesalers that control the stocks and the end-product producers. Therefore, this period is again buyer-driven and with a very low degree of regulation.

Till now, this section covered the mainstream coffee value chain, which goes through the coffee stock exchange. By relating to the Governance and Quality section (4.2.2) in the literature review this presents the combination of Industrial and Market quality convention in the buyer-driven governance mode. Its principles are based on the productivity and competitiveness among producers as far as they reach a level of standardized quality set by wholesale buyers. If the organizing principle of the trade is based on the welfare—civic convention—the leading role goes to different organizations, which try to sell the coffee as sustainable for the producer environment by some extra payment from the product consumers. The goal is that farmers' earnings should cover all his expenses and provide some extra income for survival and development. The third type of trade is based on the Domestic convention and it's based on loyalty to develop trust through the repeated interactions. The leading actor could be described as an agreement defining the term of the relationship. This kind of collaboration's coffee—specialty— is high-quality with a story behind the brand (Ponte & Gibbon 2005). In next few paragraphs, fair trade and specialty coffee are presented.

Fair-trade Coffee Chain

The fair-trade initiatives are the consequences of the market situations, where the demand side pressures the traditional producers to a such degree that they cannot maintain their business anymore. The leading actors on the coffee market set high barriers for small farm holders and make it hard for them to successfully enter the GVC. As the producers are from developing countries, they lack the domestic institutional support. One way to

address the issue is to increase domestic production—Brazil doubled it in the 90s—, however, many countries did not manage to do the same (Lindsey 2003).

The aim of Fairtrade initiatives is to redistribute incomes along the whole value chain and that end-consumers pay a bit more for sustainable development of the producing countries. However, Johannessen & Wilhite (2010) claim that the larger share still goes to actors in consuming countries. They analyzed Fare trade initiatives in Nicaragua and Guatemala and the results showed that the total benefits for farmers are still modest. Fairtrade is still part of the conventional market, where multinationals have the control.

Specialty Coffee Chain

The specialty coffee differs from mainstream coffee in quality and the chain structure. In mainstream GVC farmers do not have a motive to increase the quality, as they do not receive any additional income for it. Contrary, in specialty coffee chains farmers are directly connected to end retailers who seek and promote quality coffee (Wollni 2012). The direct connection does not include different middlemen and farmers can expect higher incomes. Differently to mainstream and fair-trade coffee markets, specialty is producer-driven and is based on the loyalty between the actors (Ponte & Gibbon 2005).

Different governance models have influenced the coffee sector and the data analysis of current trends provided some trajectories for developing countries towards upgrading. The first three steps followed the top-down direction and looked on the coffee market form the global perspective. In the final step of the GVC analysis, the bottom-up analysis looked for the potential opportunities for the Kenyan market.

7.4.4 Step 4: Upgrading

Summing up the findings from the Geographic scope section, Kenya's world market share is bellow half percent with stagnating growth trend. The situation is similar in yield efficiency and consequently, the gap behind market leaders is increasing. An important negative factor is coffee domestic consumption, which is due to the tea-drinking culture very low. Compared with the leading producing countries, the share ratio between domestic consumption and production is too low (USDA 2017).

Kenya produces premium coffee—Highland AA—, but when it is sold over coffee stock exchange, there is no additional premiums for quality, therefore, the geographical advantage is lost. Most of these coffee is later blended and the consumers are not informed about the coffee origins. Kenya's power in GVC is limited and they have no capacity to

upgrade themselves. However, there are examples that developed—China—their coffee production to a higher level and is a rising market in various perspectives.

Chinese coffee market

China entered the coffee GVC in 2002 and is now 12th biggest coffee producer. Around 95 percent of all coffee is produced in Yunnan province and country is going to invest US$480 million for market development till 2025. Its market potential attracted foreign direct investments from big world players—e.g. Nestle and Starbucks—who established large-scale operations in the province (Brown 2015). China is now producing, consuming, importing and exporting, and is present in all stages of the coffee GVC. The ratio between those market fundamentals in 2016 were 100:125:114:89 (compared to production), respectively (Appendix 5). Farmers in Yunnan have strong institutional support, good infrastructure and high consuming potential, that makes her attractive for big market players who bring knowledge and required technology (Brown 2015).

Text Box 1: Chinese coffee market development

Kenya cannot count on those attributes, therefore, its upgrading has to take different way. One could be by focusing on specialty coffee sector, which already is present in the country. The example of Danish retailer cooperative—Coop Danmark—investment gives good trajectories in which direction Kenya can go.

The case from the Text Box 2 provides a very good practice that Kenya can follow, however, this would be much easier with the government support. It is clear that this business model does not only create economic, but rather inclusive upgrading. Nevertheless, high part of the direct income for the government is lost in the direct trade, which could be a deal breaker in the future.

Making connection to the Upgrading section in the Literature review, Daviron & Ponte (2005) defined three different qualities regarding the coffee. First one is **Material** and applies to the quality of the coffee beans. Even though Kenya has one of the best conditions for coffee production, specialty coffee demands premium quality. If the quality coffee is sold on a coffee market, there is no added premium, contrary if the quality meets the demand from specialty coffee retailers, there are high premiums.

African Coffee Roasters

Coop Danmark established subsidiary—African Coffee Roasters—in 2015 and its activities are selecting good farmers, buying best quality coffee beans and do all the necessary processes including roasting and packaging of the coffee in Kenya. Then coffee is exported directly into Denmark and it is sold on Scandinavian market without any middleman under the Savannah brand. To get enough amount of the premium coffee, they provided Farmer Field School to 4,560 farmers and gave 20 Scholarships to study Coffee technology at Kimathi university. In 2016, around 15,000 small farmers have experienced a threefold income increase (African Coffee Roasters 2017).

Coop Danmark bought 2000 tons—around 4.4 percent of whole Kenyan coffee production—of premium coffee in 2016 and this can increase up to eight thousand tons in few years. Their investment in to roasting and processing facility was a bit less than US$4 million and they directly employ 40 employees. They work together with Othaya Farmers Co-operative, who now sells more than 67 percent of their coffee directly and before most of it went through the Nairobi Coffee Exchange (SABC 2016).

The farmers had to adopt to a new form of marketing. Coop is only buying from farmers that are either Fairtrade, Rainforest Alliance, UTZ certified and they are monitored, so they do not violate any human rights (African Coffee Roasters 2017).

The most promising parts of the project are, firstly, that they are importing coffee beans from Ethiopia and Rwanda, which gives to project a regional collaboration. The second opportunity is the Coop's plan to follow this model in establishing avocado, chocolate, tomato pastes and fruit jam processing production, which would present inter-sectoral knowledge transfer (Wandati 2016).

Text Box 2: Coop Danmark project

The second quality is **Symbolic** and it applies to trademarks and geographical indicators. If Kenya succeeds to promote their coffee and its quality, consumers will demand it from their local suppliers. However, due to the low domestic consumption, the third quality—**in-person service**—does not play the important part in the short run for Kenyan market.

Connecting the improvement of above mentioned qualities with the upgrading potential, two different upgrading can be identified. First one is the **Process upgrading**—material

quality—of the production and harvesting techniques. As presented in the Figure 7, Kenya is lacking in yield efficiency and in that way losing the potential for higher and better production. The usage of better fertilizers increases the soil quality and preserve it for longer periods. Changing the production trend from the last decade (USDA 2017) could stabilize Kenyan coffee supply and gave higher opportunities to sign long term supply agreements. However, process upgrading would only stabilize the market and not put them higher in the GVC.

The second is **Product upgrading**—symbolic quality—from mainstream coffee market to Specialty coffee market and this brings many benefits for the farmers (Text Box 2). The direct trading partners demand the premium quality and are ready for close collaboration and investments in farmers' education. Moreover, as the Coop Danmark case shows they are willing to move processes as roasting and packaging into the producing countries. If farmers' cooperatives are able to overtake them, this present upgrading in the GVC. Improving the symbolic quality demands increasing of Kenyan coffee reputation as geographical trademark so consumers will demand it from their specialty coffee retailers and consequently, they will look for the direct partnerships in Kenya.

The aim of the GVC analysis was to build an understanding of how the coffee GVC looks like, what are their characteristics and what are the trends. The first step showed the decreasing of farmers' income, which is putting them into very bad situation. To find the reason that pressures their incomes down, the second step analyzed the global market fundamentals and discovered a high negative correlation between the stocks and international price. Additionally, the similarity of the re-export growth in developed countries and the growth of domestic consumption in producing countries were sensed. In the next step, different governance models of the coffee GVC were analyzed and the reason that caused the change of the modes. The current period's leader actors are wholesalers and end-coffee producers in the importing countries, therefore small coffee producers—Kenya—do not have a lot of chances for upgrading in the mainstream coffee GVC. However, the case of China showed that with the right approach even this is possible.

In the fourth step, the focus moved from top-down to bottom-up approach and different possibilities for upgrading were considered. Following the good example of Coop Danmark project, two different upgrading were acknowledged. The process upgrading increases the material quality and the product upgrading relates to the symbolic quality and the shift towards the specialty coffee market.

The real potential of the above-mentioned upgrading relies on the Kenyan ability to change its coffee market industry and adopt to the opportunity. Therefore, in the next chapter National Innovation System analysis was conducted.

8 NSI ANALYSIS

8.1 Theoretical Framework

This study takes into account the innovation system approach to agricultural development devised by Agwu et al. (2008). They developed the framework to devise policy implications for agricultural extension delivery in Nigeria. The framework used here made it possible to have a comprehensive analysis with a holistic view of the coffee sector in Kenya. The study not only analyses investment environment[7] in Kenya coffee sector and the role of public institutions for innovation/knowledge in the Kenyan coffee sector but it also consists on analysis of other relevant factors such as public policies for innovation and value chain, human capital, infrastructure, financial opportunities, linkages between different actors, interactions and learning mechanisms.

It is important to analyze finance and investment environment around agriculture. Investment in science and technology has been one of the most consistent and prominent strategies to generate knowledge that can promote agricultural development at the national level. It is a generally argued, that without adequate investment in science and technology economic growth remains stagnant. The example of investment in agricultural R&D in Uganda stated in literature review substantiates the fact that investment in R&D is very important even for the very poor countries in the world. Moreover, the resulting

[7] Investment in R&D is believed to propel the agricultural sector through the application of science and technology, Agwu, et al (2008).

technological change from investment in R&D also drives social and economic development. These arguments make it imperative to analyze finance and investment environment in coffee sector of Kenya (Agwu et al. 2008).

It is not only investment in science and technology that leads to innovation in the whole system. Other macro-economic factors like government policies, human capital, legislative framework, infrastructure, and systems for knowledge flow should also be analyzed. Thus, a more comprehensive approach is used here to analyze the agricultural innovation system of Kenyan coffee sector.

Agricultural research and development has undergone changing trends such as demand driven research, liberalization, policy reforms and decentralizations which poses a formidable challenge on agricultural context. These scenarios paved the way to use innovation system approach. (Agwu et al. 2008).

As innovation is an interactive learning process that is based on interaction between different stakeholders, supported by different organizations and institutions in order to bring new products, processes and new forms of organizations for social and economic use (Francis 2006). The above definitions of the innovation system point out three important elements:

1. Individuals and organizations engaged in generating, using, adapting and disseminating knowledge
2. The interactive learning; between individuals and organizations, leading to enhanced/new products, processes or services
3. The institutions (rules, regulations and traditions) governing the interaction and occurrence of processes

Different elements of the innovation system will be analyzed in this study that will help to devise a roadmap for the Kenyan coffee sector in terms of higher quality and increased production of coffee. The study is also aimed at promoting economic development of different stakeholders especially coffee farmers. The economic development through system of innovation is based on the assumption that innovation takes place everywhere in the society and bringing different elements of the knowledge system around the common goals should promote economic development (Agwu et al. 2008).

Technology is a significant part of the innovation system. Technological development, adaptation, and imitation come under the realm of innovation. Hence, the analysis of different aspects of technology in any given field is inevitable for a comprehensive study of the innovation system. Moreover, the concept of innovation system also includes:

a. Heterogeneous actors and formal research
b. Intensity of interaction among agents

c. Institutional, organizational and managerial knowledge are as important as technical change

According to Spielman (2005), the analysis of innovation system can be used to focus on different spatial—local, regional, national—and sectoral—agriculture, automobile—levels in relation to a given technology. From this perspective, this study constitutes on different aspects of mobile/internet technology and other technologies that are used to enhance coffee quality with increased production.

Furthermore, characteristics of the national innovation system suggest considering different actors when analyzing innovation in an industry. The innovation processes are context specific and they are shaped by a country's sociological and economical experiences. The innovation system lays emphasis on the role of institutions whether these are organizations or norms, rules and laws. This study strives to elaborate different aspects of trade laws, government rules and working norms in coffee sector of Kenya. The innovation system also takes into consideration the patterns and intensity of interaction between the different actors. These patterns and intensity of interactions are considered as quality and quantity of linkages respectively by Andersen et al (2015). The innovation system also provides a basis for analysis that can be used for policy making and planning. Thus, a pivotal part of this study is based on recommendations that can enhance quality and quantity of Kenyan coffee and value chain practices at the same time (Agwu, et al 2008).

Application of innovation system to agriculture

Agriculture innovation has been subject to National Agricultural Research System NARS—from the late 1980s. It has been used to capture movement of knowledge from known sources—research—to end users—farmers—. National agricultural research system primarily focused on agricultural research as a public good and the role of state in application of the technology change. Subsequently, by 1990s, Agricultural Knowledge and Information System—AKIS—evolved as a more sophisticated system of measuring agricultural innovation. It emphasized on linkages between research, education and extension for adopting technological change. AKIS also had a limited scope and it was confined to the analysis of public sector and it did not consider the heterogeneity of agents, the institutional context shaping their behaviors and the learning processes that project agents' capacity to change (Speilman, 2005).

Due to the limitations of above systems this study is based on the agricultural innovation system—AIS—framework. It is constituted by a much broader range of actors than tradi-

tional educational, extension and agricultural research agencies. AIS assumes that innovation takes place in the whole economy, nor it is exclusively based on formal science and technology and neither it is solely technical. This perspective of agricultural innovation emphasizes on the role of farmers, suppliers of input, infrastructure, and markets in the innovation system (Agwu, et al 2008).

Agricultural innovation system is derived directly from the concept of national innovation system with sectors as the unit of analysis. AIS incorporates organizations like "research institutes, training and educational institutes, credit institutes, policy and regulatory bodies, private consultants/NGOs, farmers, farmers' associations, and public service delivery organizations". The main emphasis of the AIS is on agricultural innovations and its scope goes beyond knowledge system concepts already in place and it also suggests analyzing public sector alliances with private sector, facilitating private sector in putting forth demand-driven services. It also captures complex relationship between different actors, market and non-market institutions, measures for poverty reduction and economic development. AIS also emphasizes on the linkages between different actors to find out how the collaboration is helping in knowledge creation and dissemination, providing different inputs, creating an overall conducive environment for innovation and so forth (Agwu, et al 2008, p 1607).

Adoption of AIS perspective carried this study forward to focus on vast array of issues. The knowledge application end helped to analyze why or why not the Kenyan coffee cluster innovates. What could be the constraints for innovation in the cluster? Different aspects of the market like prices and access to technology are among other things to be analyzed to answer these questions. Smallholder farmers in Kenyan coffee sector have a significant contribution in production and AIS also provides an opportunity to focus whether they are passive recipients of technology or do they actively search for innovation. Moreover, the role of input suppliers, cooperatives, traders, and government institutes are all the crucial parts of analysis under AIS. Their analysis can enlighten the researchers regarding strengths and weaknesses of each channel with an aim of suggesting ways of improvements in their processes.

Some of the additional features are also achieved when applying innovation system to agriculture in developing countries. For example, the concept of innovation can be used in its broad sense with focus on dynamics of technical, institutional, organizational and managerial competencies. It helps to identify the actors involved in research with their scope and relationship, it recognizes the institutional climate for the organizations involved in the system that determines the outcome of the whole system. Thus, this study provides an

analysis of the government policies and their impact on the coffee industry in Kenya. (Hall and Yoganand 2002).

Application of the AIS framework in this study is further reinforced by the legitimating remarks from Speilman (2005). He argued that innovation system perspective on agriculture goes beyond socio-economic research on technical change in industrialized countries. He provides an empirical analysis of the national innovation system framework applied to agricultural sector in developing countries. He found out that the framework has been applied to agricultural research system at national and regional levels in sub-Saharan Africa, Latin America and India. The concept has been used to analyze institutional arrangements, public-private interactions and technological opportunities around agricultural sector in developing countries. The deteriorating situation in Kenyan coffee sector with regards to low production and decreasing quality, sets the ground for this study to analyze system of innovation and related value chain. As a result of this approach, this study will make some recommendations that can be useful for Kenyan stakeholders to get a stronger position in the coffee value chain with innovative outcomes in terms of production and quality.

As the framework of the study has been defined, the next step will be to analyze the Kenyan coffee sector on the lines and concepts used in this chapter.

8.2 NSI Analysis

Coffee production in Kenya is managed by two different streams of producers. The smallholder farmers, most of whom are organized into cooperative societies to have a more significant role in trade, and marketing. The 76 member-community savings group in Embu County is an example of such societies. The society collects money through contribution of smallholder farmers and further provide loans to the members in case of need. It can help farmers to buy input supplies at the time when these are needed (TechnoServe 2016b).

Second source of production is large scale state farming system (Chege, 2012). The production rate from small holder farmers and large-scale farming system is 35 and 65 percent respectively (Bichanga and Kabaka, 2013). According to the figures from coffee directorate, seven hundred thousand smallholder farmers are involved in coffee production in Kenya. The declining prices of coffee worldwide, increasing cost of inputs in Kenya making it difficult for smallholder farmers to make a reasonable living from their coffee cultivation. Hence, the analysis of Kenyan coffee value chain and innovation system is carried

out with a purpose to come up with recommendations that can help to improve performance of the sector and leveraging a positive impact on smallholder farmers' earnings from their coffee. The analysis is conducted on the basis of theories and practical examples used in the literature review. On the basis of these theories and examples, Kenyan coffee sector is critically reviewed by analyzing statistical data, literature and reports from various sources and insights from experts in coffee sector. First, sector is analyzed on a broader level to find out how different actors are clustered together. The cluster analysis is preceded by in depth analysis of different components of the coffee sector.

8.2.1 Cluster Analysis

Coffee was the first major export in Kenya and the industry has been known for its quality. Many local institutions established to follow the same goals have formed the coffee cluster. Some of the institutions have a long history. For example, Coffee Board of Kenya that was established in 1931 operates till date. The formation of Coffee Development Authority—CDA—dates back to 1964. Table 11 gives an overview of all the institutions operating today in the Kenya coffee cluster. The coffee cluster was built on the basis of strong factor inputs like good growing conditions and access to the port of Mombasa. Today the cluster also incorporates related and supporting industries that can enhance its performance. There is a strong fertilizer industry in Kenya, tourism industry is expanded than many other African countries and mobile phone industry is also developing that can be a strong medium for dissemination of information (Condliffe, 2008).

The main supply inputs required for growing coffee are seedlings, fertilizer and financing. Seedlings are grown by local nurseries which are well developed and supported by Coffee Research Institute—CRI—. Fertilizers are imported through twelve large importers and further distributed through a vast network of cooperatives or wholesalers which were numbered five hundred and eight thousand in 2005. There are also various public and private financial institutes that provide credit and other financing to various stakeholders. The cluster also reflects the presence of various institutions for collaboration supported by government of Kenya and large estate owners. CRI is one of the most prominent institutes in the cluster that serves as the main research hub, disseminating new technology and information, training growers and nursery managers, and bringing together research institutions and industry players. The Kenyan coffee sector also consists of NGOs and multilateral agencies (Condliffe, 2008).

The role of all the actors is carefully analyzed in below sections to observe how different actors are interconnected, how do they compete or coevolve towards the collective goals,

how different institutions provide technical support to each other, and last but not the least how different actors are geographically located.

8.2.2 Linkages in Kenyan coffee sector

According to Agwu, et al (2008), AIS emphasizes on the linkages between different actors to find out how the collaboration is helping in knowledge creation and dissemination, providing different inputs, creating an overall conducive environment for innovation and so forth. It is also established by Condliffe et al (2008) that Kenyan coffee sector reflects various stakeholders are clustered together. Hence, here the study focuses on existence of different stakeholders and their interaction which each other. Studying the interacting practices between different actors will help to figure out how the existence and interaction of different actors is affecting innovative practices in a positive or negative way.

Kenya coffee sector represents a model where seven hundred thousand coffee farmers are inherently connected with each other and with other coffee processing bodies—wet mills—through cooperatives. Wet mills provide services in cherry sorting, pulping, fermentation, drying and storage. These are also the cooperatives that are responsible for outbound logistics of coffee and move the coffee to other mills for further processing, make deals with marketing agents and other service providers on behalf of smallholder farmers. From production till export of the coffee, farmers are connected directly and indirectly to various institutions and actors that are involved in processing and services like research, provision of information, training of farmers etc. Below Table 11 points to different stakeholders working in Kenya coffee sector forming forward and backward linkages.

Table 11: Institutions in the Kenyan coffee sector

Government and Multi-laterals	
Coffee Directorate	Coffee Development Authority
Ministry of Agriculture, fisheries and livestock	World Bank, International Finance
Kenya Planters Cooperative Union	Corporation—IFC
Nairobi Coffee Exchange	Bi-lateral Donors
	Coffee Development Fund
Institutions for Collaboration	
Coffee Research Institute	Technoserve
East African Fine Coffee Association	Fair Trade
Kenya Agriculture Research Institute	
Kenya Planters Cooperative Union	
Universities with Degrees in Agriculture	

Source: Authors. Adapted from (Condliffe et al. 2008, p.24)

Coffee Research Institute—CRI—is a paramount example of establishing backward linkages in Kenyan coffee sector. Its board comprises of representatives from grower groups

and research universities that can fulfil the demand for means of production, science and skills. Coffee development authority established in 1964, provides technical assistance to farmers and it has also raised $3.98 million from local financial institutions to provide loans to cooperatives to build new processing factories. Coffee directorate is another example of backward linkage that regulates coffee sales and marketing in Kenya (Condliffe et al. 2008).

Coffee sector of Kenya has been subject to many short comings that have caused a significant decrease in quantity and quality of the production. It is evident from the industrial practices that one of the reasons for compromise in quality is that millers mix different coffees, irrespective of their quality which discourage farmers to work on enhancing the quality of their production (Condliffe et al. 2008). Bolloré Africa Logistics, Kenya is one of the organizations that has addressed the problem and offered the services of separating different quality coffees through a state of the art machine. The machinery is sourced from renown food processing solutions provider; Buhler Sortex Limited. There are many other organizations referred by coffee research institute in the coffee quarterly[8] that are emerging with supportive technologies for enhancing coffee quality by using innovative technology and practices. In order to fill the gap in production, a few private companies are selling micro propagated coffee planting materials. These include Genetics Technologies International Ltd and Mimea International Limited. Number of these organizations is not sufficient to fulfil national demands. Presence of all the government and private stakeholders in the coffee cluster makes it evident that there are linkages available in Kenyan coffee sector that can produce positive results if they work affectively. Following section is an embodiment of quality of linkages that will give an idea to reader about different learning outcomes—exchange of knowledge, information, other qualitative items, cost reduction and competence building— from linkages (Virgin et al. 2016).

[8] A quarterly newsletter of the Coffee Research Institute and the Kenya Coffee Traders Association

As far as forward linkages are concerned from smallholder farmers' perspective, the situation is supportive as well as discouraging. Coffee farmers are bound to market their coffee through third parties. Acquisition of marketing license is prohibitive as it requires a bank guarantee worth US$ 1 million among other requirements. At the same time the number of marketing licenses has been increased from three to twenty-five in 2006. This increase can spur competition and better services if managed properly. Number of cooperatives has also fallen from 569 to 525 from the year 2006 to 2016. The situation leads to more limited choices for farmers in choosing the cooperative for processing of their coffee (Condliffe et al. 2008). At the same time establishment of coffee processing units like African Coffee Roasters through international collaboration is a positive sign. The outcome of such projects is discussed under the sections to follow.

8.2.3 Quality of linkages

Coffee sector of Kenya depicts a relatively satisfying situation when looking at the linkages in terms of quantity. Nevertheless, it does not guarantee positive learning and capacity building outcomes for all the involved stakeholders. Liberalization of the coffee milling reduced the entry barriers for new millers. However, the entry of new millers did not bring a healthy competition instead they saturated the market due to low coffee production from farmers. It increased the operational cost for millers that was ultimately passed on to the coffee farmers (Condliffe et al. 2008).

When millers process the coffee, it goes to marketing agents who are further connected with exporters. In some cases, millers don't work for the interest of farmers because sometimes they share a cross ownership with the marketing agents. Hence millers don't share critical information with the farmers and they determine the quality and grade of coffee in absence of farmers. Sometimes, millers overstate the milling loss, distort the grades and impose hidden charges on farmers. These practices discourage farmers from producing quality coffee in line with their capacity (Kieyah & Lesiyampe 2016).

The role of marketing agents in the next step in the coffee value chain further deteriorates the situation for farmers. First of all, the presence of marketing agents puts a limitation on farmers from selling their coffee directly to exporters. Marketing agents take over the roles of farmer in facilitating warehousing of clean coffee, preparation of sales catalogue, sale of coffee at Nairobi Coffee Exchange—NCE—, offering finances and distributing coffee proceeds to various stakeholders. The role of marketing agents is not always in favor

of farmers. Marketing agents bear the minimum risk because of cross ownership between some marketing agents and the dealers. This gives rise to conflict of interest and the interlinkage between some value chain actors deprive farmers from overseeing their functions. The outcome of such activities is implementation of marketing strategies that compromise the earnings for smallholder farmers. The linkages between farmers and marketing agents can be considered as weak as they do not add much value to farmers' production and they don't get much insight in the coffee marketing process (Kieyah & Lesiyampe 2016).

The quality of linkages can also be determined by analyzing demands made by coffee producers/processors for high tech/knowledge intensive inputs from smaller enabling industries. Fertilizers are one of the main inputs, that is required by the smallholder farmers. Most of the farmers are unaware of the modern cultivation techniques and they are complacent with the old ways of working. One of the factors behind that is the average age of coffee farmers in Kenya is sixty years. Coffee farmers mostly rely on cooperatives for supply of imported fertilizers which are more expensive than what they can get from a well-developed distribution network for fertilizer from other agricultural groups.

According to Mr. Luka Ndegwa Gacheru (2015, p.26) who has 17 years of experience in coffee processing in Kenya, who describes farmers as.

> *"There are two types of farmers: good farmers and lazy farmers. The two cannot be the same. One has good coffee; but the other because he adds no manure, no fertilizer has light coffee ('nduma'). And such farmers are the majority. And if I can be honest, it's farmers who are lazy that are the biggest reason for this situation we are in. If farmers can all agree to farm well, the price can become good and problems reduce. Education is good but the morale to go read is the issue. We act as if we 'know' because we've farmed coffee for years. It's morale, motivation that we lack".*

However, in the year 2011, Coffee Initiative—a special project was started. Bill and Melinda Gates Foundation in collaboration with TechnoServe started the project with an aim to improve the coffee productivity and to improve the availability of the fertilizers that will lead to improved livelihoods of more than two hundred and fifty thousand farmers in Africa.

Text Box 3: Kenyan fertilizer market

Bill & Melinda Gates Foundation and TechnoServe

Bill & Melinda Gates Foundation and TechnoServe entered into a partnership with Yara East Africa Limited—a leading crop nutrition company. The goal of the project was to improve coffee production for farmers and to improve the availibility of fertilizers. Yara produces high quality fertilizer which is specially designed for coffee. The company makes the packaging that best suits the demand of smallholder farmers – producing bags as small as 10 kg in capacity for an affordable price of 650 Kenyan shillings. In light of farmers' inability to reach to the retailers directly, Coffee Initiative business advisors worked with local distributors to make sure that either the fertilizer reaches to farmers at their door-step or through cooperatives. The fertilizer never reached to distributors or farmers before inception of the project. Yara East Africa Limited had only one officer for all of Western Region of Kenya and the number was greatly extended by the help of people from TechnoServe. (TechnoServe 2016a)

Smallholder coffee farmers in central and western Kenya lack access to high quality fertilizers, even if they get the fertilizers they don't know how to apply them properly on the coffee trees. Such projects with a broader audience is a demand of the time through which more and more farmers can be educated and can get access to inputs (TechnoServe 2016a). The overall environment of coffee cluster in Kenya further reflects little competition among cooperatives which make them not to demand technological inputs from other sectors that can spur innovation. For example, farmers have to process their coffee within 24 hours of harvest, due to limited access to transportation they are forced to work with the closest cooperative. Cooperatives have been at the mercy of government for financial and management support for decades. After the privatization, the government stopped providing oversight and technical support to cooperatives which led to weak institutional capacity for them (Condliffe et al. 2008). Some cooperatives have responded to the management issues by outsourcing marketing practices to private agents that encourages them to provide knowledge intensive inputs but at the same time it has an adverse impact on KPCU's income. Most of the cooperatives can improve their processing practices and spur innovation in other sectors by automating some of their processes. For example, getting electronic weighing solutions, electronic moisture meters and so forth (Muthoni 2014).

It is inevitable to discuss the role of CRI in Kenyan coffee sector. It has been the research hub for the coffee cluster in conducting research, bringing in new technology and knowledge, providing trainings to farmers, analyzing soils and collaborating with various research institutions. Its board members come from grower groups, the Ministry of Agriculture, and universities.

Text Box 4: The case of Nespresso and TechnoServe

Nespresso and TechnoServe

Nespresso is working in collaboration with TechnoServe to support coffee farmers in Kenya. Focus of the two organizations is around the AAA[9] sustainable quality program that is designed to improve the yield and quality of coffee products. In this regard, Nespresso and TechnoServe have provided training and technical assistance to over ten thousand farmers in East Africa. The aim of the program is also to enhance environmental and social sustainability and that is achieved through collaboration with local governments and other stakeholders. The scope of the program is expanding and Nespresso is aiming to source hundred percent of its coffee from Kenya and Ethiopia by 2020. Nespresso and TechnoServe have also aimed at providing training to fifty thousand farmers till 2020 in order to have a sufficient well-trained work force to work effectively on the targets.
(TechnoServe 2015)

The performance of CRI has declined since privatization as government subsidy was not replaced by a stable source of income. Government imposed a 2 percent tax on coffee sales to accumulate funding for CRI but due to production decline its budget has been cut by 50

[9] AAA is Nespresso's own standard for coffee quality

percent and its staff by 70 percent (Dada 2007). In order to overcome the funding challenge, the institute strives to raise funds from internal commercial activities, services, external grants and collaborative projects.

Fortunately, due to very suitable coffee conditions in Kenya, some international players are acting as enabling industries that provide new technology and knowledge to the Kenyan coffee farmers that leads to high quality products

Establishment of African Coffee Roasters in Kenya in collaboration with Coop Danmark can also be considered a classic example of collaboration with enabling industry. The foundation of African Coffee Roasters was laid with a purpose to provide high quality coffee to Coop Danmark and other potential international customers. Success of the project can be mainly attributed to the efforts made by Danish aid organization; Danida and Peter Larsen Kaffe to implement a number of projects improving conditions for suppliers (African Coffee Roasters 2017).

One of the most prominent flaws in Kenyan coffee sector functioning is that one of the main suppliers of coffee–smallholder farmers–are currently excluded from the local chain. Farmers should be involved in processes of milling, marketing and auction of the coffee. They need to understand and scrutinize the processes for improving the quality of their coffee and know more about the demands of buyers. Furthermore, farmers are not made aware of the different subsidized inputs—fertilizers and loans—and consequently the bear a high cost of production. Coffee Research Institute is the hub for research and training works on demand basis due to lack of funding. CRI definitely needs support from government to become a proactive researcher and to extend trainings to farmers at national level.

8.2.4 University-Industry Linkages

Universities in Kenya coffee sector are underutilized. In the year 2008, there was only one university—Jomo Kenyatta University of Agriculture and Technology—that was offering degrees in the field of coffee (Condliffe et al. 2008). On the other hand, research universities are extending their services to Coffee Research Institute as some of the board members of CRI are from universities. In order to deal with limited number of universities working on coffee sector, CRI offers different courses designed for all the stake holders working in Kenyan coffee sector. CRI also encourages particularly the county governments to get into partnership with the college and undertake courses related to coffee in order to increase coffee production (KARLO 2017). The list of courses offered by CRI is provided in appendix 6.

Kenya is getting prominent among African countries when it comes to establishment of university and private incubators for agricultural development. Association for Strengthening Agricultural Research in Eastern and Central Africa—ASARECA—in collaboration with Business and Research in Agricultural Innovation initiative—UniBRAIN—is supporting three incubating institutions (ASARECA 2014).

Jomo Kenyatta University of Agriculture and Technology is hosting The Sorghum Value Chain Development Consortium; a public private partnership that is positioned to provide advisory services to commercial firms seeking short-term services and specialized facilities. The consortium is also constituted by Kenya Agricultural Research Institute. The consortium is supporting four food ventures, fourteen seed ventures and one education venture. Kimathi university has also emerged by offering the study of coffee technology. The university is working in collaboration with Coop Denmark. Through collaboration, 20 scholarships have been awarded to study coffee technology. Coop Denmark has also established African Coffee Roasters—ACR—, an organization that has renovated coffee processing factories in Africa with state of the art machines. Establishment of ACR served the purpose to provide high quality coffee to Danish organization through direct sales, so that farmers can make high profits and their livelihood is improved. Through this project 4560 farmers have been educated through farmer field schools and the project has also helped 15,000 farmers so far to have a threefold increase in their yearly income (African Coffee Roasters 2017).

It can be deduced that universities are playing a limited role in the Kenyan coffee sector as there are only two universities present so far that are offering courses related to coffee. It is not sufficient for a country where 700 thousand farmers depend on coffee cultivation for living. The presence of different incubators in Kenya is also a positive sign but their participation in the coffee sector is still missing.

8.2.5 Access to finance

Due to the decreasing quantity, prevailing low quality of coffee and limited role of farmers in the value chain the profit margins are extremely low, specially for smallholder farmers. Most of the stakeholders primarily depend on access to finance from public and private sectors for production and processing of the coffee. Farmers are mostly dependent on loans from the very beginning of the cultivation process. They turn to marketers for funding at a high interest rate. Mr Richard Ipero working as credit manager at Coffee Development Fund describes the situation (Ipero 2016, p.20) as:

> *"Marketers have been providing cherry picking and parchment advance. Some societies have been complaining about it, saying the interest rates are high, 20 percent and above; but they still go back to them. The issue is timeliness".*

Coffee Development Fund—CDF— is a department within the Commodities Fund in the Ministry of Agriculture. CDF responds to the farmers need and provide loans at affordable rates. It is getting involved with farmers' societies to ensure availability of credit and to inform farmers of the funds. Mr Richard Ipero (2016, p.20) further asserts;

> *"We can't tell marketers to stop providing credit. What we're doing as a fund is to have a competitive edge. We are known to provide affordable credit. We are also encouraging societies to ensure there is adequacy of financing from us so that they don't go to other financiers to get money whose security is the same coffee because that will affect our repayment. Once in a while marketing agents refer clients to us. Once that happens we try to address their needs, because then they will not have to resort to other means. But if you elect good leaders to societies, the issue of multiple borrowing may not arise".*

Coffee Development Fund not only provides cheap loans but it also guides farmers on how they should make affective use of the loan. Mr Richard Ipero (2016, p.20) further describes the role of CDF in providing various services from providing loans to providing consultation services in various areas.

> *"Developing coffee is not a matter of just pumping money. It requires a multi-faceted approach: does the farmer have the right technical knowledge? If you pump money to farmers who neglect their coffee, an increase in production is not realized. Then the income from the coffee does cover the loan. So, we're taking an integrated approach: technical advice, regulation, ourselves as finance, milling, marketing, working in one direction. As part of this approach, we are also encouraging integrated farming. If a farmer keeps dairy cows, goats or sheep, he's able to get manure which is required by that coffee. He's also able to get money from milk and by so doing may not be in a hurry to sell his coffee at a low price".*

Government of Kenya has considered several measures for the financial support of various stakeholders. Some of the noteworthy measure are controlling price volatility, deepening

agricultural finance and so forth. There are other measures that are already having their effect, such as distribution of subsidized fertilizers (Gatere 2016).

Kenyan treasury has taken a commendable move for credit availability to smallholder farmers. In March 2014, treasury signed a bill of partnership with the International Fund for Agricultural Development to create a facility that shared the risk and supported local financial institutions to lend at least US$ 32 million to over 700 thousand smallholder farmers from 2014 to 2017. The agreement bound the Co-operative Bank of Kenya, K-Rep Bank, Barclays Bank of Kenya and Agricultural Finance Corporation to extend the loans at the interest rate of 10-15 percent. The rate that is lower than the rate of usual bank loans which range from 16 to 24 percent in interest. Many farmers still struggle to get the suitable finance at the right time and at the rate they can afford. It is either due to lack of information, or due to slow rollout of the funds. Due to lack of financing they end up in low investment leading to reduced level of productivity (Gatere 2016).

Multi-lateral and international organizations have also been involved in provision of funds to coffee sector in Kenya. New Kiriti[10] started working with TechnoServe through the coffee initiative[11] on an eight years long project started in 2010. The project was funded by the Bill & Melinda Gates Foundation with a purpose to support smallholder coffee farmers in East Africa to increase their productivity and incomes. (TechnoServe 2016c)

There are positive examples in terms of availability of funding to different stakeholders in Kenyan coffee sector. The case of Coffee Research Institute displays a different picture where the funds are squeezed to less than half of what it used to get. Moreover, the funds and subsidized inputs available for smallholder farmers are not well exposed which leave

[10] New Kiriti is a cooperative comprised of three wet-mills, over 2600 member farmers and 50 staff members during peak production

[11] Coffee initiative is a project started in 2008 with collaboration between TechnoServe and Bill and Melinda Gates Foundation. The purpose of the project was to improve the livelihoods of smallholder coffee farmers in Ethiopia, Kenya, Rwanda and Tanzania

them unused (KARLO 2017). Despite of the efforts by the government for availability of cheap loans, farmers lack knowledge and access to them and they end up using loans at high interest rates. As a consequence, farmers yield and economic condition hardly improve.

8.2.6 Entrepreneurship and agricultural innovation

Smallholder farmers are all potential entrepreneurs in Kenya as currently only 10 percent of the coffee production is exported through direct window and rest of the coffee is exported through a government authority; Nairobi Coffee Exchange. The authority arranges coffee auctions where marketing agents from cooperatives represent the farmers. Hence, farmers don't have direct access to the auction. Currently the entrepreneurial role of the farmers is a rare phenomenon mainly because they get little attention from government to enhance quality and quantity of their production. They are not made well aware of public financial schemes that can help them to save money and invest that in expansion of their production. Moreover, farmers don't get the required services by government that can improve their coffee quality and move them a step further to take entrepreneurial actions. Mr Luka Ndegwa Gacheru (Gacheru 2015, p.26) shares his experience as,

> *"Our location has one extension officer and he has no fuel. He uses a bicycle or comes by foot. After you call him, he can take a month to come to your farm. Each sub-location should have an extension that is able to go farm-to-farm. There was a time when the government was close to the farmer. We need that closeness to return".*

Coffee farmers are deprived from marketing their own coffee which make them unaware of the export process. This practice can be considered as a setback that has a negative impact on the entrepreneurial potential of the farmers. NCE is inaccessible by many players due to strict licensing requirements. It can also serve as a restriction to potential entrepreneurs who cannot export coffee without meeting stringent licensing requirements. Although, 60 licenses were issued in the coffee year 2014/2015 yet only few of the license holders participate in the coffee export. There are only 5 dealers who control a significant share from the total exporting volume (Kieyah & Lesiyampe 2016).

Entrepreneurial activities can be well supported by different available options for getting access to finance. As it is observed in the above section that besides conventional bank loans, Kenyan coffee sector has the opportunity to get financial assistance from various public, private and bilateral organizations. Emergence of organizations like African Coffee

Roasters is a very positive step reflecting entrepreneurial opportunities. The project led to renovation of factory buildings and fitting of state of the art machines. It also helped 4,560 farmers to get education through farmer field schools and it also provided 20 scholarships to study coffee technology at Mimathi university (African Coffee Roasters 2017).

Government policies in place and their effective implementation are also very important which make the environment conducive for entrepreneurship. On the other hand, if policies are not present or not implemented effectively, they can lead to restrictive entrepreneurial environment. Kenyan government policies are elaborated here to find out their impact on entrepreneurship that have implications for quality, quantity and participation of different stakeholders in global value chain.

Until recently, it was only the Kenya Planters Cooperative Union (KPCU) that could process parchment coffee to green coffee. This model strictly regulated small producers and maintained a large favorable structure for estates. The new Coffee Act (2001) marked the end of Coffee Board of Kenya's and KPCU's monopolistic roles in the trade and transformation of coffee. In 2006, the Kenyan Government made an amendment in the Coffee Act introducing a new marketing system, besides the traditional auction system. The aim of the two systems was to encourage marketers to follow different paths securing best price for the growers. Nevertheless, the new marketing system could not escape from the public authorities' control as the contract between the trader and the grower has to be signed and registered by the Coffee Directorate. Kenya's liberalization reforms were more limited as compared to other countries in Africa. In practice only a few changes have been adopted (Gertz 2008). After liberalization, Kenyan coffee sector characterized by paternalistic management and has been converted to a semi-capitalist model of management where public authorities diverge from the open trading regime (Barjolle et al. 2016).

The control of public sector is further reinforced by the fact that private sector still lacks capabilities to organize the sector. Hence, governance of the coffee sector remains under construction after liberalization. Government agencies still try to seek control against private agents. Internal competition between different actors in order to gain the control and capture the value for profit seeking individually is jeopardizing the gathering of all stakeholders around the promotion of Kenyan coffee (Barjolle et al. 2016).

Price volatility of coffee sector is also one of the biggest problems preventing farmers from investing more in their coffee. According to Dirk Sickmueller of TaylorWich Ltd, a leading Kenyan coffee buyer (Gatere 2016, p.25):

"It's one of the most volatile commodities in the world".

He further adds,

> *"Volatility can see farmers paid Ksh.60 per kg cherry in one year, and Ksh.25 in the next. This makes it hard for a farmer to invest because he can't predict if the price shall be able to cover farm loans taken. It's no surprise that one of the most common requests coffee farmers make is, "can't the government set a minimum guaranteed return—sometimes called minimum cherry price—of Ksh.50 per kg/cherry"*

Kenyan government is not totally unresponsive to the situation and in order to encourage farmers to invest in their farms, the government is considering to setup stabilization fund that will cover farmers to deal with heavy losses that come from low market prices. Unfortunately, movement to such funds is distorted from the beginning when policy makers see examples of other countries where farmers demand exploitative prices every year. (Gatere 2016).

Coffee farmers in Kenya are always uncertain about the returns from their crops. The bigger chunk of the profits goes to cooperatives and market agents. Moreover, farmers don't get the necessary inputs and trainings that suppress their entrepreneurial activities. Due to these conditions, farmers hardly manage to pay off their loans after selling their coffee which serves as a bottleneck for them to invest more in their farms and extend their production. Cooperatives have also saturated the market and they also operate under deep debts, which hinder them to invest in entrepreneurial activities. In such scenario, international collaborations like establishment of African Coffee Roasters bring a hope for the sector. Projects like these significantly improve the livelihood of farmers by giving them a direct window of export and encouraging them to invest more in their farms to produce higher amounts of quality coffee.

8.2.7 The role of ICT

Kenya has emerged as one of the leading countries in terms of Information and Communication Technologies—ICT—in Sub-Saharan Africa. The government understands the importance of ICT as a driver of economic growth and actively supports the ICT sector. In addition to the presence of large international firms such as Nokia, IBM, and Google, local start-ups are expanding at a reasonable pace. As a result, Kenyans are getting access to an increasing number of services through their mobile phones. There is a great potential for agricultural sector to leverage from the reach of mobile services that can facilitate communication that is not interrupted by distance and volume (Torero & von Braun 2006).

Nonetheless, many of these services are provided by local companies and most of these services have a limited scope and remain at a small scale (Baumuller 2016).

Agricultural mobile services are offering a vast array of services in Kenya and these can be categorized in four groups. Information and learning, financial services, access to inputs, and access to output markets. Majority of the services focus on provision of information for crops via SMS, phone call or website. Some radio stations also offer interactive learning programs where farmers can send questions via SMS. However, the impact of these services is yet to be assessed in order to determine how useful are the services and how widely are used (Baumuller 2016).

Irrespective of the growing ICT and mobile phone users many of the mobile services available in countries like Kenya are barely touching upon the point that is technologically possible. Smartphone penetration and 3G networks are limited in many rural areas and most of the applications are designed for low-tech phones and delivery technologies like SMS (Hatt et al. 2013).

In order to fulfil the gaps related to limited use of ICT services and disseminated through basic technologies like SMS, some projects have emerged that take into account the use of advanced technologies and are provide various services to farmers in Kenyan coffee sector.

Overall orientation of Kenya is going to the right direction in terms of advancement in ICT but it is going at a slow pace with a limited scope. The case presented in text box 5 is limited to only western part of Kenya and catering only five thousand farmers. Such services should be extended in the whole country so that farmers can be more knowledgeable and they can have a more transparent relationship with the cooperatives.

Text Box 5: Use of ICT in Kenyan coffee sector

The case of Lutheran World Relief (LWR) and Bungoma County Coffee Development Group (BUCCODEG)

Farmers' organization in Kenya face difficulties in spreading the news to its members about agricultural techniques, improved yields, or sharing of the market prices to help members for getting fair prices. Lutheran World Relief has partnered with six coffee cooperatives in Western Kenya to use ICT approach to improve the services. Through this approach the partnership has resulted in enhanced extension system, improved transactions records, increased accountability and trust among the members. Responding to the facilities, farmers have become more active in cooperatives with improved coffee growing and processing activities, and accessing previously unused financial services.
The project has resulted in creation of enhanced ICT extension system with 80 trained community knowledge workers who use smartphone application to assist other farmers looking up market and weather information, accessing tips and advices, and input supplier directory. The project was initiated with collection of data from five thousand farmers allowing BUCCODEG to forecast members' production, track the quality of coffee and map other farmers that need additional help. Other prominent services of project include text messaging services between cooperative management and members; enhancing the communication, establishment of mobile money payment – reducing associated risks of cash transactions, and broadcasting interactive radio programs to diseminate good farming techniques. (LWR 2016)

8.2.8 Genetic Technologies

As it has been asserted in this study that genetic technologies are very crucial for enhancing a crops productivity and quality. Consumers of agricultural products are becoming more and more conscious about the quality of food that is produced in an environment friendly way and that can help to resist different diseases. New breeds of tomatoes that help in preventing cancer is an example. Here, Kenyan coffee sector is analyzed with regards to different plant breeding technologies and their impact on quantity and quality of

the coffee production. It will help to understand different aspects of technological capabilities in Kenyan coffee sector and to find out strengths and weaknesses.
Kenya coffee sector reflects the use of genetic technologies which is a sign that besides growing the coffee in old and conventional ways by old farmers, new technologies are also emerging. Currently there are two companies in Kenya that are selling micro-propagated coffee planting. The technology is introduced by Genetics Technologies International Ltd—GTIL—and Mimea International Limited in Kenya (Virgin et al. 2016).

Recently, a new hybrid variety resistant to the cherry coffee disease has been introduced with the name, Ruiru 11. It replaced local arabica cultivars but unfortunately it was failed at a later stage as it affected the coffee quality. As a consequence, the roasters who always categorized Kenyan coffee as high quality and it was their first criteria for selecting Kenyan coffee, stopped sourcing from Kenya. Hence, the launch of a new variety has been in vain due to its adverse impact on the quality (Barjolle, 2017).

Coffee Research Institute is working intensively on different technologies to improve the quality of coffee inputs leading to a higher quality coffee production. Its work has resulted in improved seeds that are taller—10-25 percent—and develop more nodes and larger and healthier leaves. Improved seed quality is attributed to a special product; MiziziPower. It is a combination of exhaustively controlled humification of various plant residues mixed with poultry manure and diverse microflora. The use of MiziziPower resulted in riper cherry and earlier picking. The product is currently used in more than 50 states (Mburu et al. 2016).
Despite of the advancement in different technologies the widespread adoption is at risk due to lack of awareness which leads to a limited adoption among smallholder farmers. However, science, technology and innovation—STI—get a significant attention under the development pathways in Eastern Africa. Kenya has developed policies to facilitate a coordinated framework through which STI can be integrated in agricultural sector (Juma 2015).

8.2.9 Infrastructure

According to Condliffe et al. (2008), one of the biggest hindrances in the improvement of coffee sector is aging transportation infrastructure. Strength of the factor conditions on

which coffee cluster was formed is eroding over time due to under investment in infrastructure. The port of Mombasa has been a critical factor for the coffee trade in the early 20th century. The port has a decreased attractiveness now due to inefficiencies at the port and high taxes imposed by government. The external factors have also put a new impact on Kenya's transportation advantage. Neighboring Tanzania has privatized its port in Dar es Salaam which significantly increased the capacity, limiting role of port of Mombasa in Kenya.

Kenya's road network is in dire need of investment as Kenya has only 13 percent of paved roads and highest rate of accidents and deaths in the world. Farmers do not have reliable access to transformation and they are forced to choose the cooperatives/processing mills that are closest to them. In this course of action, they lack information of other better cooperatives that can render better services to farmers (Fukubayashi & Kimura 2014). Most of the farmers also lack access to relevant weather forecast data that can assist them to choose between different suitable crops according to the weather condition. It can bring an impact on the production if based on weather information farmers grow drought resistant crops during the dry periods and slow growing varieties when the weather is wetter than normal. However, CRI is trying to help coffee farmers by publishing quarterly weather bulletins advising them on the husbandry and processing practices to be adopted according to expected weather conditions (Marigi 2017).

Farmers are also suffering from lack of communication with Nairobi Coffee Exchange; the only authority managing auction of the exporting coffee. NCE is yet to launch a website to communicate and share market information with the farmers. NCE also faces legal, financial and operational constraints that prevents it from working effectively. Its legal status is not yet clear, hence the validity of its trading rule is not totally acceptable. The exchange has very limited financial and human resources. It relies on outdated infrastructure in form of inadequate trading and sample room space, and outdated ICT systems. On the whole, NCE is working under serious limitations that impedes its effective role as an independent and self-sufficient entity (Kieyah & Lesiyampe 2016).

There are other significant institutional weaknesses that add to the infrastructural challenges for Kenyan coffee sector. The country has a limited number of hydrological observation stations to monitor flood levels. River gauging stations are also deteriorating with the passage of time due to lack of repairing services and maintenance after flood events such as 1998 El Niño flood. Moreover, automatic data sensors also lack frequent recalibration. In the recent years, coffee growing regions around Mount Kenya have received above

average rain that make the region more vulnerable to floods. In such situation, it is really important to maintain and update the machinery that can help to tackle with torrential rain and floods (Marigi 2017).
Kenyan coffee sector is also threatened by the diminishing arable land size. Due to increasing demand for housing societies, coffee farms are squeezing. Recent example is the town of Thika that is lined up with coffee plantations that have been sold to developers. Many smallholder farmers who are unable to make a reasonable sum of money from their coffee crops are abandoning the crops altogether for other more lucrative crops (The Economist Newspaper Limited 2016).

The above analysis of the national innovation system pertaining to Kenyan coffee sector was conducted to detect strengths and weaknesses. It is determined by the GVC analysis that Kenyan coffee sector can flourish solely based on the production of specialty coffee. As specialty coffee is the highest quality coffee and it demands best practices to be adopted from the beginning of coffee production process. In order to capture the higher market-share in specialty coffee, Kenya should not only concentrate on the quality of coffee but its quantity should be increased as well. These insights from the GVC analysis made it inevitable to study Kenyan market from innovation system perspective in order to suggest ways of improving quantity and quality of coffee.

Kenya is endowed with the factors that help to produce one of the highest quality coffees in the world. On the other hand, innovation system analysis makes it evident that there is a great power imbalance in the system and farmers are suffering a lot due to that. It can be observed that NSI of coffee sector is pervaded with bad examples when the local actors and their interaction are taken into account (Condliffe et al. 2008). At the same time, there is a strong presence of factors that can contribute significantly to support innovative practices and enhance coffee production and quality. For example, a very supportive financial system is there but farmers hardly get benefit from it due to lack of communication (Gatere 2016). A strong fertilizer sector is also present but it is hardly utilized by the coffee sector. Moreover, paved roads are lacking in Kenya and it has adverse implications for Kenyan coffee sector as due to limited road access, Kenyan farmers are unable to get innovative inputs from different sources and farmers cannot reach these sources themselves (Library of Congress 2007).

At the same time, when international players like Nespresso and Coop intervene into the system, they bring a significant change into the quantity and quality of coffee and also

improve livelihood of various stakeholder, especially farmers'. If government of Kenya uses the same model implemented by Coop – bringing the right input at the right time and giving sufficient training to farmers – it can significantly improve innovative practices at a broader level. It implies that Kenya has the potential in the innovation system, all the country needs is to have an effective governance, improved quality of linkages and supply of available inputs at the right time but in order to do that there are formidable challenges on the way that should be handled effectively.

9 CONCLUSION

In the next paragraphs, the thesis' research questions were answered by using both GVC and NSI analysis. The global coffee market has an increasing production and consumption, with a high impact on the producing countries. Since the liberalization in the 90s, the trend of an increasing export in all producing countries stopped and less than 20 percent of countries continued to grow (USDA 2017). The differences between both groups are mostly in yield efficiency and their better positioning in the market. Vietnam became the second biggest coffee producer by having a lower coffee quality but with high yield efficiency and low costs. Similarly, China is strategically increasing production with the same speed as consumption, import and re-export, which enables capturing all the processes in the GVC.

Relating to the project's sub-questions derived from the main problem formulation, one of the aims was to ***identify Kenya's position in the current coffee GVC that would allow the country to upgrade***. The first step of the analysis demonstrated the rise of big producers and the stagnating process of the smaller ones in the mainstream coffee market. With less than half a percent of the world's coffee production, Kenya plays an unimportant role and moreover, in the second step—NSI analysis—major problems in the Kenyan market were exposed. The current policy structure leads farmers to sell their coffee beans to cooperatives and these are later, in more than 90 percent, sold on the mainstream market via the Nairobi Coffee exchange. As the demanded quality for mainstream coffee is very low, most of the value from high quality coffee beans is lost. Therefore, the new government policy should go in a direction to get most of the value and some initiatives showed the direction to go. Coop Danmark is using the quality and Kenyan geographic trademark to sell it as a specialty coffee in the Scandinavian market. By moving all the value chain processes—except the retail—Kenya gets higher added value, new knowledge and much higher incomes for the farmers involved. So, Kenya should re-position themselves towards niche specialty coffee market, which exclude middlemen, but leads to economic and social development—inclusive.

By identifying the position that leads to upgrading in the GVC, the focus moved on towards the required policy changes to achieve this and to answer ***how NSI can help Kenya to enhance quantity and quality of coffee in order to have a higher share in the GVC***. With the NSI concept, various stakeholders and linkages were analyzed and thereupon, the major problems identified. The majority of the them are relating to un-balanced relationships between farmers, cooperatives and the Nairobi Stock Exchange, which allows farmers to struggle at the same time as the other two groups maintain good incomes. As there are no extra earnings for farmers, there is no investment in new technology and the coffee production became unattractive for younger people, resulting in farmer's average age to be around 60 years. High discrepancy between urban and rural areas is seen in bad infrastructure, which additionally hinders the development of coffee farms. Considering all stated problems, the government should establish a set of policies to create a NSI and by maintaining good linkages between farmers, research, financial organizations and responsible institutions, attract the FDI for the specialty coffee market.

The answers to both sub-questions stem from the mix-methods approach that allowed the authors to look beyond the limitations of each method. By using methodological triangulation, different data were used in the thesis and the theoretical triangulation helped to use the collected data in a broader way. In that way, thesis's main research question asking "**how can developing countries upgrade their coffee production in the global value chain by using systems of innovation? The case of the Kenyan coffee sector"** could be answered with the outcomes gathered from the analysis.

The developing countries can upgrade their coffee production in the global value chain by re-positioning themselves to more niche markets that give better value for their coffee and potentially overtake new processes from the GVC. The Kenyan opportunity is to get more value from its high-quality coffee by direct sale—specialty coffee—, that brings new knowledge, investments and innovations. The implementation of the set of policies to establish NSI could restructure Kenyan coffee market and linkages between the actors.
In the following discussion, the results were elaborated more in-detail to show the basis for a set of recommendations presented after. Moreover, the next chapter also contains the discussion on the theoretical synthesis of GVC and NSI concepts and its usefulness in this thesis.

10 DISCUSSION

The coffee GVC analysis tried to answer whether producing countries can upgrade and in what way. The focus was primarily on farmers and the first step of the analysis defined different activities and segments inside the coffee GVC (Figure 4). Additionally, the value distribution was analyzed from a historical perspective. The results showed that farmers' incomes are decreasing relatively to retail price and stagnating in absolute terms (Table 5).

As the payment for farmers come from domestic middlemen, the analysis in the second step was on the international coffee market and not the retail prices. The correlation analysis showed that stocks, especially in the exporting countries, significantly influence the market price. Since the control of the stocks were taken over by private actors after the liberalization in the 1990s, governments do not have power to influence the price anymore (Daviron & Ponte 2005). The analysis of production and consumption showed, that after 1990, big producing countries increased their market share and contrary smaller decreased. Moreover, the domestic consumption in producing countries has a similar growth as the re-export in consuming countries, which indicates that most of the consumed coffee is imported from the EU (Figure 7). The domestic consumption in producing countries attract FDI from multinationals. Only two countries managed to grow significantly—China and Vietnam—and both have high yield efficiency, which indicates the importance of the quality of farming (Figure 5).

The third step made an overview of the four coffee periods, looking at different governance modes and the reasons for change in the market. The producing countries—except in Brazil 1906—cannot change the GVC governance, but global regulation, change in consumption habits and trends or political instability could. The fourth step, bottom-up approach, the combination of the Geographic Scope data and theories from the literature review—Quality and Upgrading—provided two upgrading opportunities for Kenya; process and product upgrading. Looking individually, process upgrading does not improve the Kenyan position in the GVC but rather improves the quality and quantity of the coffee beans. On the other hand, product upgrading—into specialty coffee—brings inclusive development and it is very good for farmers. However, due to the bad practices presented in the NSI

analysis, most of the premium coffee (AA, AB) is blended and sold at mainstream coffee quality price. The data from the Kenya Coffee Traders Association shows, that they produced 18 percent of the best AA and 35 percent of AB quality of coffee (KCTA 2017). The coffee beans graded AB are not as highly-valued as AA, but it is still considered as a premium coffee and appropriate for specialty coffee (Espresso & Coffee Guide 2016). Considering the transportation problems described in the NSI analysis, initiatives as Coop Danmark, is limited to a specific area, thus there might not be a potential for their growth. In order to use the whole potential of upgrading in the GVC, process upgrading is necessary for upgrading. Only with better yield and management with coffee beans at mills, Kenya can improve the coffee processes that will attract similar initiatives as Coop Danmark. The GVC analysis gave a better understanding of coffee the GVC and its trends. It also showed the upgrading path for Kenya, and that their government has mandate and tools for achieving it.

The main tasks of the NSI analysis were to scrutinize the industrial structure by taking into account the roles and performances of all the relevant actors. A two-fold analysis was conducted to have an in-depth study of public and private entities that form a system of innovation in the Kenyan coffee sector. As there are seven hundred thousand smallholder farmers involved in the coffee production, the whole innovation system should revolve around them to help them produce specialty coffee with an increased production.
A close look at several of the factors that affect coffee quality and quantity provided insights as to why smallholder farmers make very small profits from their crops which deprives them from using innovative inputs. The basic reason for them is the inability to sell their coffee directly to the importers. Most of the cooperatives selling and processing farmers coffee are a sheer example of mismanagement. The mismanagement is basically provoked by the government that has created an environment where farmers cannot sell their coffee directly and furthermore cooperatives hardly get any help from the government to improve their functioning.

Smallholder farmers have significantly limited access to capital available to them. As the NSI analysis concludes, farmers get limited access to fertilizers and affordable financial inputs which are the main drivers of high quality coffee production with innovative inputs. In addition, the poor infrastructure has also affected the mobility of the farmers that prevent them from using different mediums of innovation (Gatere 2016).

Under all such circumstances, some farmers try to defy the odds when they become part of some special initiatives and their performance improves significantly in terms of quantity and quality of the coffee through innovative inputs and training. Nespresso's partnership with TechnoServe can be a relevant example here; Nespresso strives to source all of its coffee from AAA sustainable quality and the company is extending its program in Kenya and Ethiopia by providing training and technical assistance to farmers (TechnoServe 2015).

Tarciana Ciokinyua is one of the farmers in Embu County, Kenya, who has benefited significantly from the program. Through the training, she is more equipped now with the right farming practices and makes much higher profits. (TechnoServe 2016b).

The example of Coop Denmark, mentioned in box 5 is also highly relevant here, it is helping various stakeholders to improve quantity and quality of coffee through transparent processes. The project has helped farmers and other stakeholders significantly to achieve premium prices for their coffee, giving them a chance to be more innovative and have a better livelihood.

Most of the cooperatives are yet to play their role in the development of the specialty coffee sector. The cooperatives constitute a very adverse environment for farmers; when they start mixing coffee of different qualities, don't share risk with the farmers – don't provide a reliable timing of payment to farmers and get a significant share of the profits – and defy conflict of interest (Dorsey 1999).

The government should devise policies to eradicate mismanagement from cooperatives and at the same time the government should take measures to expand the direct sales window for the smallholder farmers through which specialty coffee is exported. If the government applies the same model that is used by international cooperatives like Coop Denmark, where timely provision of inputs is ascertained, it can enhance the quantity and quality of coffee at a broader level. The diversification of the supply of the Kenyan specialty coffee can have several practical applications worthy of note. It can urge cooperatives to improve their performance, giving multiple opportunities to farmers for the trade of their specialty coffee. An increasing balance between direct sales and sales through cooperatives for farmers can be important here as improvements in only one segment cannot lead to a full utilization of the available sources.

Finally, the improvement in farmers' conditions through the specialty coffee may have positive effects on the child labor problem in the sector. As presented in Chapter 6, every

third child in Kenya aged between 6 and 14 years, has to work and most of them in agriculture. This influences their enrollment in education and consequently, lowers the potential for future development. Initiatives like Coop Danmark demand from farmers not to violate any human rights, including child labor. With higher earnings, farmers could afford to hire adult workers and allow children to attend school. Even though most of the attention in the thesis was on the economic upgrading, the social aspect should not be overlooked. The farmers' incomes that do not cover the costs of production are not only destroying their business, but also their family existence. Therefore, governments and different actors in the GVC should consider improvements to allow both economic and social upgrading—inclusive—for farmers.

10.1 Moving toward a synthesis

In the following paragraphs, the combination of the GVC and NSI will be discussed first from the academics' perspective and later, the project's authors will reflect their approach against the academics' views. Due to the rather challenging problem formulation, the answering process consisted of two concepts, moreover, the mixed methods were applied.
According to Jurowetzki et al. (2015) the focus of each concept—NSI and GVC—is on a national and international level, respectively, and one could see them as contradicting. One of their conclusions referred to the role of the government's policy and its power, as NSI scholars believe government play an important role and contrary, GVCs' presume that government cannot significantly interfere in the value chain structure. The next difference to consider is the relationship between upgrading and innovation whether they are synonyms or rather different concepts (Morrison et al. 2008). As identified, upgrading activity itself is not fully examined, it needs to be better placed into the context of countries and markets, otherwise it may lead to wrong policy suggestions.
In relation to this issue, Bellù (2013) analyzed the role of the value chain analysis for policy making. Since it focuses on technical relationships and various distributions along the chain, it is more an accounting framework than a behavior model. The identified chain's actors are thus not studied in-depth enough—i.e. only the identification of linkages and not their quality—, however this part could be taken from another theory. Also, Bellù defines value chain analysis as a 'static framework', lacking of a time dimension.
Similarly, Pietrobelli & Rabellotti (2011) describe GVC analysis' limitation as not emphasizing on the institutional context, especially at the firm level. To overcome this, the combination of Innovation system and GVC are proposed. Firms sense the opportunity in the GVC and innovations allow them to satisfy its demands—based on quality,

efficiency, standard etc. In the light of that discussion, Jurowetzki et al. (2015) conclude their research with a hypothesis, that the development of China and South Korea—in general and not in the coffee sector—is a result of the strategies, based on both, GVC and NSI perspectives.

From the beginning of this thesis, both concepts were considered. This required a deep insight into methodological opportunities and as result mixed methods were choosen. By reflecting the results to the above presented views, it was understood that the GVC analysis focuses vertically over the chain from the first stages—coffee farms and estates in the developing countries—till the last stages of retailing in developed countries[12]. Thus, the observed relationships between actors are international and vertical across different stages. Contrary, the NSI analysis payed attention to linkages between the market's actors in Kenya—horizontally. However, the analysis showed various international linkages, mostly between NGOs that helps to improve farmers' conditions through trainings and fair-trade activities.

The GVC analysis showed the potential upgrading opportunities for Kenya, but they rely on the government and other coffee market institutions. Taking in to consideration Kenya's position in the coffee GVC, where they play a limited role with less than 1 percent of production, they might change the country's policy structure, but not GVC's. The role of innovation and building capabilities may be a tool or a cause for upgrading, thus it could be argued that they are not synonyms.

The quantitative approach for the first part of the analysis, based on a data covering the last 26 years and the time-series analysis, showed the dynamics of the coffee chain, including the trends. Despite the results showed some opportunities for Kenya, the GVC analysis recommendations could be misleading. Without NSI's part, which showed Kenya's issues with selling high quality coffee for the low mainstream coffee price, policy

[12] The GVC analysis showed the increasing consumption in producing countries, therefore some end retail activities took place in developing countries.

could go in the wrong direction and not addressing the right problems. Similarly, the recommendations from the NSI without the input from the GVC, which showed that Kenya has an opportunity in niche specialty coffee and not in the mainstream coffee market, would only go in to improving quantities and qualities of the coffee.

To conclude, by using a more dynamic GVC analysis the results were based on the trends, yet they would still miss more in-depth behavior view. With the combination of the NSI analysis, the project's results and recommendations combine the synergy from both schools of thought.

11 RECOMMENDATION

The GVC analysis provides a starting point for policy recommendations and presents a valuable tool for achieving specific policy objectives— i.e. growth and poverty reduction. In light of the conclusions, the Kenyan government should first decide what the main goals and directions are and what direction their coffee sector should go. In this process, the country's position in the coffee GVC should be considered and moreover, the expectations derived from other chain actors identified. As mentioned in the previous chapter, they can only upgrade by entering the niche market of specialty coffee and in that way benefit from their high-quality coffee—product upgrading. Due to the current practices and infrastructure conditions, these values are lost. However, they have a limited amount of the highest ranked coffee, therefore the process upgrading goes hand in hand with the product upgrading.

From here on, the recommendations are based on the weaknesses identified through the NSI analysis and considering the results from GVC analysis. Kenya should focus on following areas in order to improve the competitiveness of its coffee sector:

(i) Affective communication channels between government and different stakeholders
(ii) Infrastructure
(iii) Improve functioning of the local value chain by increasing competition, enhancing management practices and reforming governance structure

As Kenya has a very limited contribution in to the world coffee export, it should do something to differentiate itself from other coffee producing countries. Kenya has high quality growing conditions which provide a unique acidic flavor, a black currant aftertaste and smooth finish to the coffee (Kieyah & Lesiyampe 2016). Kenyan coffee has those unique characteristics and qualities at the time as the specialty coffee industry is booming.
In order to capture the specialty coffee market, Kenya needs to have an efficient national system of innovation that leverages high quality and deeper linkages with related industries. As it is revealed from the NSI analysis that the Kenyan coffee sector is not taking much advantage from sources like availability of cheap credit to smallholder farmers and a strong fertilizer industry. These are the main inputs required to produce high quality

coffee with an increased production. Due to a lack of financial capital, farmers don't buy fertilizers and in turn it is effecting the quantity and quality of their crops. Farmers predominantly get loans from cooperatives and banks at a high interest rate and they buy fertilizers mainly from cooperatives due to their lack of knowledge of cheap loans and higher quality fertilizers available from other channels. The Coffee Board of Kenya should play its centralized role here, and through the extension services all the coffee farmers should be made aware of different options available to them so that timely availability of inputs is made sure. The CBK should appoint farmers from all the coffee producing counties and they should be given the task to educate all the other farmers working in the same counties about availability of the necessary resources. This program should be facilitated with proper trainings by government institutions on how to use inputs in an appropriate way. Through this system, farmers can connect with each other and share the tacit knowledge which can help them significantly to improve quantity and quality of their crops at a low cost. Moreover, the loans should be provided to farmers in a timely manner so they can buy the inputs at the right time.

Poor infrastructure is one of the root causes for some of the major problems in the Kenyan coffee sector. Frist of all, farmers face difficulties in transporting their coffee to the right cooperative due to poor road connections. Farmers access the nearest cooperatives irrespective of their performance and this is why cooperatives don't have to struggle to entice farmers. Hence, poor infrastructure causes an alleviated competition among cooperatives. The Kenyan government must spend more resources to have longer paved roads connecting countryside with the urban areas. This will help farmers to choose the right cooperatives and will instigate competition among cooperatives, consequently enhancing their performance. Farmers should also be made aware of the more competitive cooperatives so that they can make more informed decisions.

Modernization of the Nairobi Coffee Exchange in terms of infrastructure and involving farmers in the auction is highly needed. The NCE should launch a website as soon as possible to make the relevant information available for farmers. A lack of human resources should be met with capacity building through farmers, and experienced traders and brokers. The outdated infrastructure, and inadequate trading and sample room spaces should be replaced with state of the art facilities that plausibly represent Kenya in front of international buyers. The involvement of farmers in the coffee auction can help in marketing of the coffee by relating the coffee to farms and farmers and creating a distinct Kenyan brand.

After liberalization, the Kenyan government does not intervene in the functions of cooperatives which also lead to a diminishing performance of cooperatives. The government should establish standards for cooperatives to enhance the competition between them. Moreover, a limit should be imposed on cooperatives for a charging commission from the farmers to stop their exploitation and bring balance in value sharing by different stakeholders.

The port of Mombasa is a great advantage for Kenya, but Kenya's Port Authority needs to improve its operational performance for further development. A full potential of the port can only be reached through an improved railway and road linkages (Condliffe et al. 2008).

A holistic view of the Kenyan coffee sector unveils the presence of actors that can take the sector out of their problems if they function properly. Improved functioning can only be possible through increased competition, enhanced management practices and reforming of governance structure. Institutes like the Coffee Board of Kenya and the Coffee Research Institute, can constitute a supporting infrastructure but cannot make any contribution without an adequate governance structure.

The government should resume financial support to cooperatives to make them self-sustained in the short- and long-term. The government has also halted its support to the CRI which is the main institute conducting research on seeds, soils, fertilizers and so forth. CRI is also responsible for management assistance, market information and technical training to smallholder farmers. The CRI mainly relies on its own commercial activities for financial support. The organization should target international organizations for financial support which can also attract more international players like Nespresso and Coop to have more direct channels of export for the farmers.

Institutions like the CRI should also establish connections between specialty coffee companies and cooperatives. The government standards for functioning of cooperatives can enhance their performance, and in that case, it is more likely for the cooperatives to establish connections with specialty coffee buyers. Kenya's government can play an important role here by connecting coffee cooperatives and farmers with international spe-

cialty coffee companies. It can be realized by establishing agro-industrial parks by following the example of Ethiopia[13]. The parks in Ethiopia promote an efficient supply of the commercial food products where production is linked to the market. These parks are established with an aim to facilitate input sources. The government provides land and infrastructure for further investment and attracts local and international investors (Embassy of Ethiopia BXL 2016).

The government of Kenya should invest more in infrastructure by renovating cooperatives, providing training and inputs to farmers and connecting them with international coffee companies like Coop and Nespresso. A better infrastructure, arable land and suitable conditions, competitive cooperatives and trained farmers with adequate supply of inputs can attract international players which can boost FDI and export of the Kenyan specialty coffee. It can provoke a sense of competition between other cooperatives which will have far reaching positive results for farmers as well. Through international collaboration cooperatives will be urged to produce high quality coffee and in this regard, they should separate different qualities of coffee beans. It will help to adequately compensate the farmers and it will motivate them to produce high quality coffee in increased quantity. International collaboration can also provoke cooperatives to track farmers who produce high quality coffee for better compensation which will develop competition among farmers as well.
The Nairobi coffee exchange also requires immediate attention for upgrading the storage of coffee, using latest ICT and establishing direct connections between farmers and importers. The infrastructure needs more financial input and the whole governance should be improved to make all the stakeholders in the coffee trade more informed.

[13] Ethiopia houses Integrated Agro-Industrial Park; a cluster of firms grouped together to share infrastructure, buying, selling, training and extension services.

The issue of corruption should be addressed at all levels. The government must deal with corruption in relevant ministries and institutions. It should be ensured that the different licenses are granted purely on merit basis and to the most competent candidates. Corruption at the cooperative levels should also be dealt with. Some actors from the cooperatives hold dual status and take dual advantage by compromising the benefits and risk sharing for farmers. A clear policy should be implemented by the regional governments to tackle such issues.

Table 12: Policy recommendations

Recommendations	Objective	Outcome
Affective communication channels between government and different stakeholders	Farmers should be made aware of different channels of input like fertilizers and cheap loans, knowledge sharing	Cost effectiveness, more knowledgeable farmers, high quality and quantity coffee
Better infrastructure	Connecting farmers with best cooperatives, renovation of cooperatives, Support to CRI, establishment of Agro-Industrial Parks, more equipped Nairobi Coffee Exchange Modernizing NCE and involving farmers in the auction	Competitive cooperatives, more knowledge inputs and trained farmers, FDI, higher exports, improved livelihood of farmers Alluring international buyers, enhanced branding of Kenyan coffee
Improve functioning of the value chain by increasing competition, enhancing management practices and reforming governance structure	Setting standards for cooperatives, training to cooperatives, balancing direct sales and sales through the Nairobi Coffee Exchange, tackling corruption	Balance in value sharing, Competitive Cooperatives, equal risk sharing and income distribution between different stakeholders

Source: Authors

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13 APPENDICES

APPENDIX 1: COMPETITIVENESS IN GVCS

Factors Affecting Developing Country Competitiveness in GVCs

Factor	Description	
Productive Capacity	Human capital	The cost and availability of labor Upgrading worker skills
	Standards & certification	Codified public and private product and process
	National system of innovation	Flows of technology and information among people, companies and institutions Closing technological gap
Infrastructure & services	Transportation, ICT, Energy & Water	Impact of the cost and quality of infrastructure to business development
Business environment	Macro-economic stability & public governance	Instability deters FDI
	Ease of opening a business & Permitting/ Licensing	Entrepreneurial environment
	Access to finance	An important factor for technological development
Trade and investment policy	Market access	Extent of tariffs and import restrictions
	Import tariffs	Became a "tax" on exports in GVCs for producers
	Export-import procedures	Reliability and timeliness of delivery
	Border transit times	Reliability and timeliness of delivery
	Industry-specific policies	Promotion policies designed to support specific industry participation and upgrading
Industry Institutionalization	Industry maturity & coordination	Experience of firms in participating in GVCS
	Public-private coordination	Linkages important to overcome challenges for GVC participation

Source: (Bamber, Fernandez-Stark, et al. 2014, p.12)

APPENDIX 2: VARIABLES

Variable	Description	Source
Dependent Variable		
International Coffee Price—ICO	The price calculated based on the market share of exports of each group of coffee weighted	International Coffee Organization (1990-2016) ICO (2017)
Independent Variable		
Production	The amount of coffee beans produced in a country per year.	United States Department of Agriculture (1990-2016) USDA (2017)
Domestic Consumption	Volume of coffee consumed in a country per year	United States Department of Agriculture (1990-2016) USDA (2017)
Yield Efficiency	The harvested production per ha for the area under cultivation.	Food and Agriculture Organization (1961 – 2014) FAOSTAT (2017)
Stock in Exporting country	The average volume of green coffee in an exporting country	International Coffee Organization (1990-2016) ICO (2017)
Stock in Importing country	The average volume of green coffee in an importing country	International Coffee Organization (1990-2016) ICO (2017)
Total re-export	Volume of coffee re-exported from all destinations in a given year.	International Coffee Organization (1990-2016) ICO (2017)
Import	Volume of coffee imported in the country per year	United States Department of Agriculture (1990-2016) USDA (2017)
Export	Volume of coffee exported in the country per year	United States Department of Agriculture (1990-2016) USDA (2017)

APPENDIX 3: DESCRIPTIVE STATISTICS

Descriptive statistics						
	Price	Production	Consumption	StockIM	StockEX	Total_Stock
N	27	27	27	27	27	27
Min.	45.59	88,946	86,574	7,716	14,589	35,385
1st Qu.	65.52	101,984	100,857	16,030	22,525	44,078
Median	107.68	117,217	122,918	18,653	40,968	51,495
Mean	103.77	120,026	121,417	17,351	37,151	54,502
3rd Qu.	130.61	135,378	142,098	20,187	52,449	68,350
Max.	210.39	160,178	158,167	23,038	55,792	73,844
SD	40.85586	21,717.21	22,007.66	4,626.949	14,697.93	13,301.93

Source: Authors from (ICO 2017; USDA 2017)

APPENDIX 4: CORRELATION COEFFICIENT

Correlation coefficient between ICO price and other variables

Column1	1965-90	90-2016
ICO price	1.00	1.00
Global coffee availability	-0.50	0.05
World production	0.32	0.53
Stock in importing countries	-0.11	-0.03
Stock in exporting countries	-0.76	-0.71
Total stock	-0.77	-0.80
Consumption	0.45	0.54

Source: Authors from (USDA 2017; ICO 2017)

APPENDIX 5: CHINA'S COFFEE SECTOR DEVELOPMENT

China's coffee sector development between 2002-2016

(1000*60 kg bags)	**2002**	**2004**	**2006**	**2008**	**2010**	**2012**	**2014**	**2016**	**I_{2016}**
Production	324	361	428	555	827	1.535	2.200	2.500	100
Consump-tion	117	222	226	338	1.106	1.628	2.416	3.125	125
Imports	224	300	415	477	984	1.561	1.889	2.850	114
Exports	431	439	617	694	705	1.468	1.473	2.225	89

Source: (USDA 2017)

APPENDIX 6: KENYA COFFEE COLLEGE

Kenya Coffee College training programs for 2015-2016

Coffee Factory Management	Effect of Climate Change on Coffee Production
Coffee Farm Management	Coffee Certification
Coffee Nursery Management	Coffee Rehabilitation and Replanting
Coffee Pest Management	Basic Coffee Brewing Techniques
Coffee Stakeholders	Youth Entrepreneurship in Coffee
Coffee Quality Assessment	Women in Coffee Business
Sustainable Coffee Production	

Source: (KARLO 2017)