



BI Norwegian Business School - campus Oslo

# GRA 19703

Master Thesis

Thesis Master of Science

Supply chain management - Wastage within the fresh produce supply chain: A case study of mangoes in Ethiopia.

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Start: 15.01.2020 09.00

Finish: 01.09.2020 12.00

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Supply chain management - Wastage within the  
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mangoes in Ethiopia

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Hand-In Date:  
June 2020

Examination code:  
GRA 19703 – Master Thesis

*This thesis is a part of the MSc program at BI Norwegian Business School. The school takes no responsibility for the methods used, results found and conclusions drawn.*

## **Preface**

This thesis marks the completion of two years of higher education at BI Norwegian Business School. The submission concludes our Master of Science in Business with a particularly rewarding major in Logistics, Operations and Supply Chain Management. We find the combination of sustainability and supply chain management immensely interesting. Thus, we would like to thank the SUSTAIN project for the opportunity of writing a thesis that combines both the practical and theoretical aspects of sustainability. There are a number of people who should be given special thanks for their contribution.

First, we would like to thank and express our sincere gratitude to our supervisor, Professor Marianne Jahre, for guiding us through this learning experience and introducing us to the SUSTAIN project. We would also like to thank her for constructive feedback, dedication and engaging lectures throughout the master's programme.

Second, we would like to thank Jimma University and africaJUICE for allowing us to conduct interviews and arranging for our stay in Jimma and Awash respectively. Our research became more valuable due to the discussions and observations we had during our visit to Ethiopia. Other participants such as ECX and AAA are also thanked for being cooperative and accommodating.

Finally, we would like to sincerely appreciate our friends and family for their support, enthusiasm and advice throughout the duration of this Master Thesis.

The emergence of COVID-19 has had an effect on the process and the way we have tackled our thesis. We are pleased with each other's contribution and feel that we have managed to work together successfully. The same has to be said when it comes to the communication and collaboration with our supervisor, even though we all had challenges due to the unforeseen events. Furthermore, additional information on the research trip in relation to the SUSTAIN project has been mentioned in the attached file.

Simen Cesar Kinserdal

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## **Executive summary**

In recent years, there has been an increasing focus around the term sustainability and its practical implications. One major component in this development is the “accelerated productivity in food chains”. The relevance of our thesis will be aligned with this reasoning and aims at becoming a significant contribution to the field of practical sustainable implementation. The research question we will be answering is: *How can the theory of supply chain management be applied to reduce the wastage in the mango supply chain in Ethiopia, in particular the post-harvest handling of mangoes?*

A literature review was conducted to understand why and how supply chain management (SCM) can reduce wastage in the Ethiopian fresh produce supply chain (FPSC). During this process relevant components were identified and followed up by finding an appropriate framework for analysing the case. The reasoning for choosing Trienekens’ framework (2011) is that it enables us to gain a comprehensive and wider scope which captures the context that is present. The framework is used to; 1) assess constraints, 2) analyse the chain and 3) examine the upgrading possibilities to improve the performance of the supply chain. Thus, ultimately leading to a reduction in the post-harvest losses of mangoes in Ethiopia.

A qualitative research strategy has been used, which is supported by an abductive approach. The research design chosen is a case study which has given in-depth information within the research. Overall, the findings are similar to the literature; pinpointing how excessive handling, exploitation of other actors and inadequate infrastructure are key factors for the wastage. However, we argue how these factors are present not as a result of the smallholders, but because of their surrounding circumstances and lack of successful government intervention. We suggest that the actors can improve their performance by altering the smaller actors’ position - horizontally and vertically, and utilize the reasoning behind best practice SCM - where transparency, collaboration and value sharing are present. As the smaller actors have limited possibility to alter their position in the market configuration, we conclude and recommend the formation of collaborative agreements horizontally - through cooperatives, or forming relationships with global actors to improve their vertical position. Lastly, to truly improve the performance of the local chains, incentives throughout the whole chain need to be initiated between the actors.

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# 1.0 Introduction

## 1.1 Motivation

In recent years, there has been an increasing focus on the term sustainability, with the definition of “meeting the needs of the present without compromising the ability of future generations to meet their own needs.” (Brundtland, 1987, p. 41). The United Nations (UN) has introduced the well-known sustainable development goals (SDG`s) in alignment with the definition of sustainability mentioned above. These 17 goals were adopted by all the UN members in 2015 with the common agreement to fulfil the goals by 2030 (United Nations, 2019). However, there is insufficient knowledge around the logic behind the two terms; sustainability and SDG`s. Even though the terms are based on the Brundtland definition, both of them are obligated to operate within the planetary boundaries. Planetary boundaries can be defined as “...a safe operating space for humanity based on the intrinsic biophysical processes that regulate the stability of the Earth system.” (Steffen et al., 2015, p. 1259855-1).

The paper “transformation is feasible” argues for how the scope around the different SDG`s are interconnected (Randers, Rockström, Stoknes, Golüke, Collste, & Cornell, 2018). That is, if one solely focuses on some SDG`s, it will influence the fulfilment degree of the others. The authors have created an integrated scenario analysis, which explores different pathways for the implementation of Agenda 2030, with the planetary boundaries in mind. They reach a conclusion where they substantiate how the only way to meet most of the goals by 2030 relies on five transformational actions with interconnected effects on the SDG`s. The “accelerated productivity in food chains” is emphasized as one of the transformational actions, thus we strive to produce a thesis which can contribute to this area and to the general global sustainable improvement.

Furthermore, the proportion of undernourished people worldwide increased from 10.6 per cent in 2015 to 11.0 per cent in 2016. This translates to 815 million people (Sustainable Development Goals, 2018). For the past few years, the number of undernourished people worldwide has been constantly decreasing, however, it is on the rise again. In Ethiopia, for example, around 21.4% of the population was

undernourished in 2016 (World Bank, 2019). One of the main reasons for undernourishment is the lack of food in developing countries.

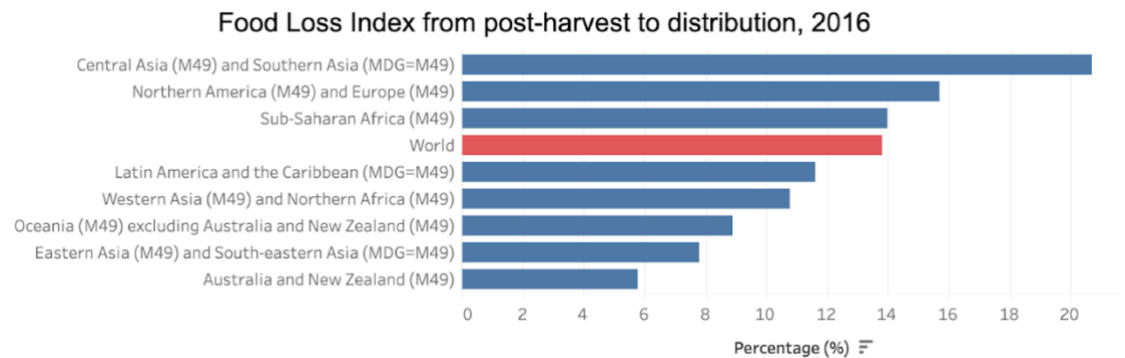


Figure 1 - The Food Loss Index (FLI) as shown in the figure focuses on food losses that occur from post-harvest to distribution. (Sustainable development goals - indicators, 2020)

Each year, an estimated 1/3 of all food produced ends up rotting in the bins of consumers and retailers or is spoiled due to poor transportation, harvesting and post-harvesting practices (Sustainable Development Goals, 2019). If this wastage of food can be reduced, the number of undernourished people might decline.

We have chosen Ethiopia as our country of focus because Ethiopia is a developing country with a rapidly growing economy. The Ethiopian agricultural sector accounts for 52% of the national income, and 80% of the employment (Hanjra, Ferede, & Gutta, 2009). Therefore, there is reason to argue that a large number of their population relies on agricultural production – especially fresh produce. Furthermore, availability of resources related to post-harvest handling is limited, as a result, the post-harvest losses are high (Jalata, 2010). However, over the last decade, the actors involved in the fresh produce supply chain have been focussing on increasing the availability of such resources. Thus, we have chosen Ethiopia as our focal point to analyse and assist the efforts being made by the actors within the chain. The product that we have chosen is Mango as it is ranked 2nd and 3rd in total production and area coverage among fruit crops in Ethiopia, respectively (Dessalegn, Assefa, Derso & Tefera, 2014). Since mango is a highly perishable commodity, it requires intense care and post-harvesting techniques to improve its shelf life. As Ethiopia is a developing country in Sub-Saharan Africa with a lack of infrastructure and resources, many mangoes are wasted in the post-harvesting process.



## **1.2 Problem Statement**

The dual adaptation of UN's SDG's and the realisation of the importance of planetary boundaries, represents a global paradigm shift towards a more sustainable future. However, to reach these desired goals and agreements, one has to practically implement the severe and complex solutions. Randers et al. (2018) argue for how the only way to meet most of the goals by 2030 relies on five transformational actions, where the "accelerated productivity in food chains" is emphasized. The relevance of our thesis will be aligned with this reasoning and aims at becoming a significant contribution to the field of practical sustainable implementation. The research question we will be answering is:

*How can the theory of supply chain management be applied to reduce the wastage in the mango supply chain in Ethiopia, in particular the post-harvest handling of mangoes?*

## **1.3 Thesis Structure**

The thesis is divided into 9 sections where the first chapter is the introduction. The introduction is followed by the literature review which gives insight into the relevant topics in relation to the case. After presenting the literature, an overview of the theoretical framework has been given along with additional relevant literature. Section 4 represents the research methodology followed during the study. The final parts of the thesis include the findings from the research trip followed by a discussion of the findings in relation to the theoretical framework. Lastly, the conclusion is presented and suggestions for future research have been discussed.

## **2.0 Literature Review**

In this section, a literature review has been conducted using previous research and theories to explain relevant topics and issues concerning the FPSC in Ethiopia. The section has been divided according to the contextual background, utilisation of resources & infrastructure, market configuration and best practice SCM. These topics with their respective sub-sections have been discussed below.

### **2.1 Contextual Background**

#### **2.1.1 Food Waste**

Fruits are perishable commodities. This naturally high perishable nature of fruits combined with high ambient temperatures and poor post-harvest handling leads to losses in fruit quality, and ultimately to post-harvest losses (Jalata, 2010). Widodo, Nagasawa, Morizawa, & Ota (2006), claim that the total loss of agricultural fresh produce is between 20-60% of the total amount of harvested products in any country. This is a huge loss for any developing nation considering the impact it has on the people living in such countries. It is important to distinguish between avoidable food waste, food that could have been eaten, and unavoidable food waste, such as stones, bones and peel (Ridoutt, Juliano, Sanguansri, & Sellahewa, 2010). In this thesis, waste in the FPSC will be considered as avoidable food waste. We aim at reducing these losses in the FPSC by optimizing the supply chain and in particular the post-harvest handling of fresh produce.

The problem of food wastage in developing countries is on the farmer's end, whereas in developed countries it is on the consumers' end. This is supported by the findings of the Food and Agriculture Organization, which states that per capita wastage by consumers in Europe and North America is 95-115 kg a year, while consumers in developing countries throw away only 6-11 kg a year (Gustavsson, Cederberg, Sonesson, Otterdijk & Meybeck, 2011). According to the same study, consumers in rich countries waste almost as much food as the entire net food production of Sub-Saharan Africa (Gustavsson et al., 2011). This shows us that the main problem in developing countries is on the farmer's or intermediary's end of the supply chain as the consumers do not waste as much. In other words, the overall problem is that the products are not able to reach the consumer in the quantities that it should because of wastage throughout the supply chain.

### **2.1.2 Ethiopia**

Ethiopia's history can be traced back to nearly 400,000 years ago. The area is usually considered to be the place where early humans emerged (Moen, 2017). It is the second most-populous country in Africa and its capital, Addis Ababa, is also considered to be the political capital of Africa (Moen, 2017). The local currency in Ethiopia is called Birr. Agriculture still remains the largest sector of the economy, however, the government is trying to diversify into manufacturing, energy generation and textiles (Nevins, Thay, Gish, & Latif, 2017).

In the past, Ethiopia has been perceived as a country of widespread poverty, droughts and economic stagnation. However, this perception is not entirely true as the economy of Ethiopia has shown tremendous growth in recent years. The real gross domestic product in 2018/19 grew by 9 per cent, driven by the manufacturing and service industry (International Monetary Fund, 2020). It is estimated that Ethiopia has the largest population of livestock on the entire African continent. It is also among the top ten cattle-producing countries in the world, with leather goods being the second-largest exports of Ethiopia (Nevins et al., 2017). Apart from the export of goods, the European Council on Tourism and Trade chose Ethiopia as the World's Best Tourism Destination for 2015 (Nevins et al., 2017). As seen in figure 2, Ethiopia has been receiving a higher share of foreign direct investment (FDI) as compared to Sub-Saharan Africa and other developing countries. Thus, all of the factors mentioned above indicate a promising future for Ethiopia.

## Foreign Direct Investment

(Net flows in percent of GDP; average over 2016–2018)

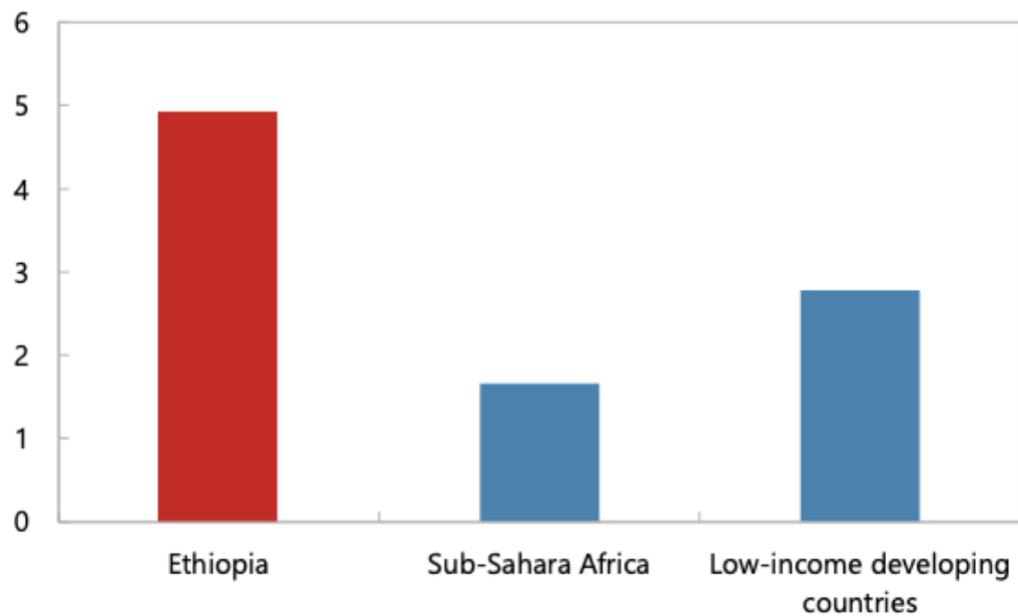


Figure 2: Comparison of FDI in Ethiopia against Sub-Saharan Africa and other developing countries (International Monetary Fund, 2020).

The government has also been increasing its focus on the development of infrastructure in rural areas. They have invested huge amounts on the construction of roads by formulating large scale infrastructure development programs since 1997 (Tegebu & Seid, 2017). These projects will enhance access to markets and enable farmers to sell products in such markets. The government believes that roads are crucial in improving the living standards in rural areas and increasing agricultural productivity (Tegebu & Seid, 2017). Apart from investing on roads, the government has also invested in a light rail system in Addis Ababa, which is the first rail system to be built in sub-Saharan Africa (Nevins et al., 2017).

There have been problems with agricultural practices in the past, however, most of Ethiopia differs from this grim view. Most of the farmers living in rural areas reside in rainfall sufficient areas where the harvest is normal in most years (Dorosh & Rashid, 2013). Thus, the reality of agriculture and food security situation is complex. This is because of variations over time in Ethiopia due to weather shocks, changes in policies and other factors (Dorosh & Rashid, 2013). Ideally, a description of Ethiopia's agriculture industry should include the serious problems as well as the progress being achieved within the industry at a national level.

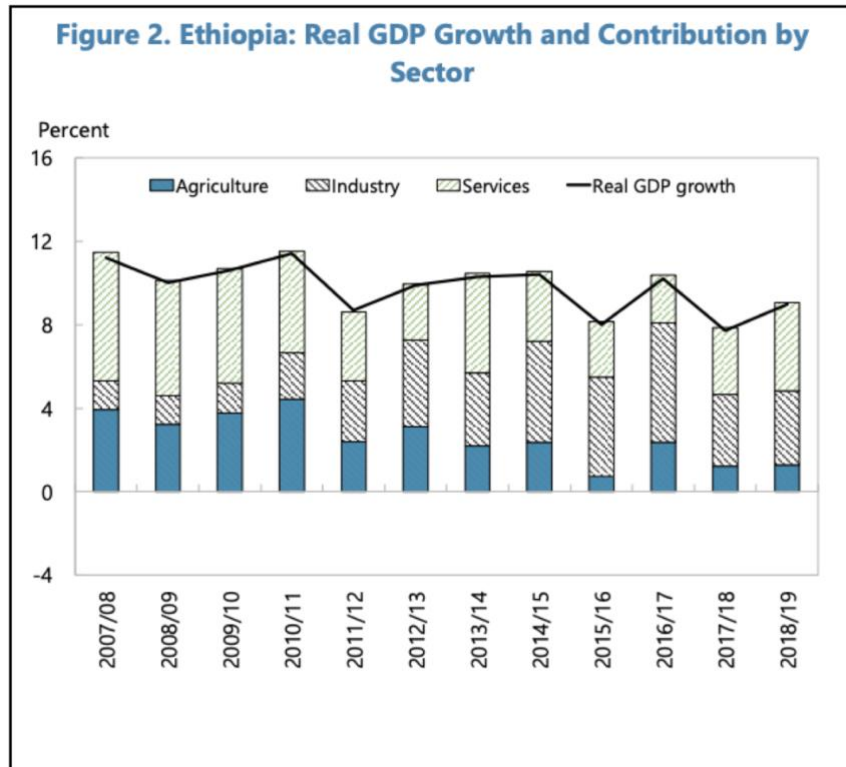


Figure 3: Shows the change in real GDP growth and sector wise contribution from 2008-2019 in Ethiopia (International Monetary Fund, 2020)

The economic importance of improving productivity in the agriculture industry is visible in a country like Ethiopia as agriculture accounts for 47% of the GDP and 85% of the employment (Mekonnen, Dorfman & Fonsah, 2013). However, all is not well when it comes to the agriculture industry and food security in Ethiopia. Food insecurity and malnourishment remain significant problems with the occurrence of local food shortages (Dorosh & Rashid, 2013). Keeping this in mind, the government has been trying to introduce an agricultural policy that can help in transforming the rural economy and hence reduce rural poverty (Baye, 2017). Also, one of the reasons for Ethiopia’s recent economic success has been continuous agricultural growth, which was 2.9% in the 1990s and 6.2% in the 2000s (Dorosh & Rashid, 2013).

### 2.1.3 Mango

Mango is often referred to as the “king of fruits” due to its taste and appearance. It is also among the most widely traded and cultivated fruit crops in the world (Beshir, Alemayehu & Dessalegn, 2019). The mango crop is grown in 85 countries in the world with an annual production of 35 million tonnes (Honja, 2014). It can be

consumed in a variety of ways such as fresh fruit, juice, dried form, frozen, pickles and chutneys.

When it comes to the importance of mangoes in Ethiopia, according to the central statistical agency (CSA, 2013), out of the 107,890.60 hectares of land under fruit crops in Ethiopia, mangoes contribute towards 14.29% of that area. Also, mango is a good source of nutrients for the consumers as it has moderate levels of vitamin C, is rich in provitamin A, vitamin B1 and B2, along with many other essential minerals (Mukherjee & Litz, 2009). However, it is also a climacteric fruit, which means that during ripening, increased ethylene production takes place. It continues to ripen even after being separated from the stem, which means that there is a higher probability for the fruit to be overripe if not consumed in time (Mukherjee & Litz, 2009). Being a climacteric fruit, other fruits within this segment also have very similar characteristics. Thus, in general they are constrained with huge post-harvest losses.

The most important consideration of all the stakeholders in the mango supply chain should be to maintain the quality of the harvested mangoes from the farm until it reaches the final consumer. With the loss in quality, the wastage of mangoes increases significantly (Esguerra & Rolle, 2018). This is because the retailers reject these poor quality mangoes or consumers prefer to buy higher quality mangoes. As a result, the mangoes left out have to be thrown away unless they are used for something else, such as juices (AJ 1, 2020), jams and dried fruit. Thus, it is essential to understand the importance of post-harvest handling in case of mango.

Major losses in quality and quantity occur after harvest at various stages within the supply chain (Esguerra & Rolle, 2018). The growth in the number of supermarkets and increasing demand from institutional buyers has forced the traders to focus on post-harvest handling of mangoes (Esguerra & Rolle, 2018). These losses not only lead to wastage of mangoes, but also make it difficult for the traders to capture the entire profits. For example, poor handling can lead to bruising and weight loss which reduces the marketable weight when selling the product (Esguerra & Rolle, 2018). If the post-harvest losses are not minimized, the gains from an increase in production will be offset by the losses and the potential income will not be realized.

## **2.2 Utilisation of Resources and Infrastructure**

In this section, relevant literature concerning the categories of resources and infrastructure is presented. Furthermore, the relation of these categories with their coherent subcategories to the post-harvest losses of mangoes in the FPSC in Ethiopia has been advocated.

### **2.2.1 Use of Fertilizers, Pest and Disease Control**

Fertilizers are very important in agriculture because they replace the nutrients that crops remove from the soil. Without the addition of fertilizers, agricultural productivity and crop yields would be reduced significantly (Yara, 2019). In the article by Hussen & Yimer (2013), 90% of the respondents did not apply either inorganic or organic fertilizers on the mango trees. When it comes to disease control, 30% of the farmers reported that diseases attacked the mangoes, but only 2% used any form of fungicide (Ssemwanga, Rowlands, Kamara & Haddis, 2008). In the same article, 40% of the farmers reported problems with pests, but only 3% used any form of pest management. Most of the farmers control birds while the fruit is maturing but are not aware of the solutions to control other pests and diseases (Hussen & Yimer, 2013). This further substantiates the fact that there is inadequate utilisation of fertilizers and pest management techniques.

### **2.2.2 Methods of Harvesting**

In Ethiopia, the most common method of harvesting fruit adopted by small farmers is hand picking, cutting by scissors and/or using a stick (Honja, 2014). Hand-picking the produce during harvesting can maintain the quality of the fruit and protect it from any damage like bruising. Using a stick, however, may result in dropping of fruits which can lead to fruit bruising and physical damage (Hussen & Yimer, 2013). Even though most farmers are using handpicking, there is a need to stop using sticks to improve the quality of mangoes.

### **2.2.3 Packaging**

Most of the farmers in Ethiopia use a basket for the transportation of fruits from their farms to the market. The surface of the basket is usually rough which causes physical damage and is a source of contamination because it is difficult to clean (Hussen & Yimer, 2013). The long road journeys undermine the quality of the fruit

and the potential value generated at the farmer level (Honja, 2014). Temperature also plays a very important role in the quality of mangoes and their postharvest life because of the physiological and biological changes that take place after harvesting (Ravindra & Goswami, 2008). A lot of mangoes in Ethiopia are transported without cooling, in open baskets often in warm weather, and this reduces the quality of the harvested mangoes (Hussen & Yimer, 2013). All of these factors combined show just how important packaging is when it comes to the quality and shelf life of mangoes.

#### **2.2.4 Processing**

In spite of the substantial amount of fruit produced in Ethiopia, the national fruit processing industry is limited. One reason is that highly developed, low-cost processing industries in other countries sell their products at a lower cost in Ethiopia and outcompete local producers (Ssemwanga et al., 2008). The same article claims that lack of technical knowledge in processing also acts as a major challenge in the development of the fruit processing industry in Ethiopia.

#### **2.2.5 Infrastructure**

Most low-income countries face a problem with inefficient infrastructure. In Ethiopia, it is the same, as the infrastructure is still developing throughout the country (Chao, Burdic, Ganjawalla, Derbew, Keshian, Meara & McQueen, 2012). To improve conditions in food-deficit areas, there is a need to invest large amounts to develop and extend road networks (World Bank, 2005). In order to accelerate the rate of market development, it is important for the public sector to support the private sector and collaborate. This can lead to a reduction in the barriers to market access and establish equitable relations between producers and intermediaries (World Bank, 2005). In their article from 2006, Viswanadham & Kumar argue that insufficient supply chain practices are the reason for this waste, mainly due to inadequate infrastructure, lack of adequate cold-storage and transportation, especially in developing countries. In the same manner, De Boer and Pandey (1997) found evidence suggesting that inadequate infrastructure can explain the inefficient performance of a supply chain. Below, a brief argumentation has been presented concerning the several variables that need to be considered in relation to our general term; “infrastructure”.



### **2.2.6 Roads and Transportation**

An estimated 1/3 of all food produced is wasted each year due to poor transportation and harvesting practices (United Nation, 2019). Roads are the most important form of infrastructure needed in developing countries to improve connectivity. In Ethiopia, there is a lack of feeder roads connecting the farmers to the marketplace. Even if there are roads, they are of poor quality, not passable in bad weather and in disrepair (Hanjra et al., 2009). A study shows that there is a need for investments in roads and other market conditions in Ethiopia to encourage agricultural growth (Diao et al., 2005). Better access to markets can lead to lower transportation costs and expand the market for different products, better roads also mean less damage to fruits. Improved roads reduce the time taken to reach the markets and also prevent a reduction of the mango's quality. Evidence suggests that investment in the rehabilitation of rural roads improves market development in that area as well as the local community (Calderón & Servén, 2008). Thus, although costly, investing in transportation can lead to a lot of benefits that generate economic surplus. As with every major investment, the result does not show up immediately. Another significant reason for agricultural waste is the lack of infrastructure for cold storage in developing countries (Viswanadham & Kumar, 2006).

### **2.2.7 Technology**

The exchange of knowledge between supply chain partners enables innovation and development of technology (Cao & Zhang, 2011). In countries like Ethiopia, there is a need to use technology that can minimize agricultural wastage (Jalata, 2010). Information Technology (IT) can be an upgrade which can lead to huge benefits and is being used by a lot of companies across the world. Improvement in supply chain capabilities with the help of IT allows companies to learn and respond to market changes in a better and faster way (Wu, Yenyurt, Kim & Cavusgil, 2006). In Ethiopia, the present level of communication infrastructure is not sufficient, however, it is a growing area under development which will affect the Ethiopian agri-business society in the future (Viswanadham & Kumar, 2006).

Although primary activities like the processing of fruit juices are increasingly being moved to developing countries, value added processes are still located in developed countries (Trienekens, 2011). There is a need to move the value added processes to the developing countries to help them with innovation and technology. The lack of

such processes can also be attributed to the fact that export markets have higher quality and safety requirements because of which the supply chains dealing with export markets are often more developed (Trienekens, 2011). The Export Trading Group (ETG) is a company which has managed to link small African farmers to a diverse set of buyers globally. Their success is also attributed to investing in the necessary infrastructure and transportation required to support the farmers and their business (Patel, 2014). Thus, this example illustrates the importance of investing in supply chains in developing countries in order to supplement the farmers and their business.

## **2.3 Market Configuration**

This section discusses the interrelationships within the market configuration and how they relate to the post-harvest losses of mango. Furthermore, important aspects within market configuration; smallholder-broker interaction, cooperatives and the Global Value Chain (GVC) will be debated.

### **2.3.1 Smallholder-Broker Interaction**

Ethiopian smallholders sell 69% of their produce to private brokers (Hanjra et al., 2009). This is because the smallholders are separated from the markets, where nearby markets are only accessible by camels, carts, mules or by foot – where the mean travel time is about seven hours (Hanjra et al., 2009). Many smallholders, therefore, lose significant revenue to the brokers because they have limited or no price information. This is where the concept of principal-agency theory comes into play.

Principal agency theory is widely used to evaluate relationships between actors, especially connected to contract relations problems (Wiese & Toporowski, 2013). As one party authorizes another to perform a task, agency relation occurs between the actors, where the authorizer is the principal and the performer is the agent. The reasoning behind such a relationship is for the principal to use an agent to perform a task that he is not good at himself, with the goal of achieving a win-win outcome for the participants. To do so, the principal needs to implement incentives for the agent to induce him to perform the task in a sufficient manner (Wu, Lan & Liu, 2014). In our case, as the farmer authorizes the broker to act on his behalf, the smallholder is the principal and the broker is the agent. Furthermore, the theory

assumes that individuals are governed by their own self-interest and seek opportunism (Ciliberti, De Haan, De Groot & Pontrandolfo, 2011). The theory presents two distinct challenges: (1) misrepresentation of ability; adverse selection, and (2) lack of effort; moral hazard, both of which apply to the agent (Fayezi, O'Loughlin & Zutshi, 2012).

### **2.3.2 Global Value Chain**

The importance of global value chains in relation to information exchange and collaboration connected to diffusion of knowledge and innovation is highlighted by Pietrobelli & Rabellotti (2011). The authors acknowledge the crucial fact that most innovations and other advancements happen in developed countries, whereas in less developed countries the same progress around knowledge, technology and other innovation is often “imported”. Other literature openly claims the importance of how chain leaders facilitate and assist local producers in upgrading (Barnes & Kaplinsky, 2000; Morrison, Pietrobelli & Rabellotti, 2006; Schmitz & Knorrige, 2000). Thus, the literature gives evidence on how interaction with a GVC can provide access to new markets, access to knowledge, enhanced learning, innovation and increase the overall performance of the smallholders (Pietrobelli & Rabellotti, 2011).

### **2.3.3 Cooperatives**

Independent farmers and smallholders are vulnerable to both broker's and trader's opportunism because of the farmer's low market power. The intermediaries possess high bargaining power and do not facilitate collaboration between the parties as they want to maintain their bargaining power (Honja, 2014). The Ethiopian government advocated for commercialisation through cooperatives in the agro-commodity industry rather than individual commercialisation (Francesconi & Heerink, 2010).

The major issue restraining the development of the mango industry in Ethiopia is the lack of organization like a farmer organization or a cooperative among mango growers.

With the above reasoning in mind, the Ethiopian Commodity Exchange (ECX) was established in 2008. The purpose of ECX was to promote such commercialisation

of agricultural cooperatives, specifically in the coffee industry - through a common commodity exchange platform (Gabre-Madhin & Goggin, 2005). The article further explain how such a commodity exchange should serve as a marketplace where sellers and buyers meet in an organized manner to transact. Such a commodity exchange should also increase the level of trust between the practitioners. The same can be argued for the mango industry, where the creation of cooperatives and commodity exchanges can improve the conditions within market configuration for all the actors (Honja, 2014). Furthermore, the use of modern communication and information technology facilitate higher transparency and thereby increased concentration of buyers and sellers, which can both reduce transaction costs and improve market efficiency (Andersson, Bezabih & Mannberg, 2017; Gabre-Madhin & Goggin, 2005; Meijerink, Bulte & Alemu, 2014). However, Francesconi & Heerink (2010) further advocate for how the impact of cooperative memberships may actually vary undoubtedly depending on the type of cooperative organisation considered.

As established earlier, interaction with cooperatives such as commodity exchanges induces a reduction in transaction costs, thereby increasing overall performance. However, the research of Gelaw, Speelman & Huylenbroeck (2017) investigates how these potential gains are transmitted back to the various markets along the supply chain. The result indicates how the market chain, at each level, favoured the buyers. More precisely, the countries` gains were sub-optimal, and the afflicted victims were the millions of smallholders located at the upstream of the chain.

Newer research conducted by Belay & Ayalew (2019) emphasizes the importance of price information and transparency for farmers - and underline how price is the most important decision variable for any farming activity. Their research discovered that access to accurate price information enables the smallholders to increase their average farm-gate price and thereby incentivizes the farmers to allocate further investments into their commodities traded within the cooperatives. Hence, the resulting synergy nudges the smallholder to produce more of the traded commodities, enhancing the output share of the relevant cooperative.

In summary, the research done on collective actions and cooperatives advocates for the benefits it can provide, however the result of such initiatives will vary

significantly based on the type of cooperative considered and the resulting incentives experienced within the initiative.

## 2.4 Best Practice SCM

As established earlier, for the last two decades, the global business environment has experienced severe changes in terms of competitiveness. Some of the considerations that supply chains need to manage include volatile markets, a paradigm shift towards sustainable business practices and continuous pressure on competitiveness. Christopher (2016) advocates that there are mainly two principles that are in motion to perform efficient supply chain management; the principles of lean and agile. Note that the extent to which each of them should be applied is based on the chain's contextual settings.

Agility refers to the chain's ability to be flexible and manoeuvre efficiently in challenging circumstances (Christopher, 2016). Furthermore, Christopher (2016) pinpoints that capturing market information, translating this information and acting on it, are the preconditions to mastering the principles behind agility.

The principle of lean is related to increasing the process flow and reducing non-value adding activities (Myerson, 2012). Manzouri & Rahman (2013, p. 38) state:

*“To be competitive in today's global market, reducing the total cost to its lowest and eliminating waste across all units of a company are the most important keys to success. In this regard, a collection of efficient tools which organisations can rely to decrease the cost and waste, as well as to provide effective service for the customers demand is very beneficial and valuable.”*

Collaboration within the Supply chain has been widely advocated by academics and consultants since the mid 1990's (Holweg, Disney, Holmström, & Småros, 2005). It is strongly advocated that creating a synchronized supply chain can lead to an increase in responsiveness and a reduction in costs (Holweg et al., 2005). The importance of collaboration will be discussed within market configuration in the next section.

Furthermore, it is widely supported that transparency plays a major role in agricultural supply chains, especially when it comes to sustainable SCM (Bastian & Zentes, 2013). “In transparent supply chains, access to information is simple and fast” (Bastian & Zentes, 2013, p. 554). Lack of transparency within the supply chain can lead to information asymmetries, which is an important cause of the principal-agent problem mentioned above. Thus, the primary benefit of transparency is its ability to mitigate the principal-agent problem (Bastian & Zentes, 2013).

*“Since transparency diminishes incentives for opportunistic behaviour by supply chain partners, serious conflicts should be rare in transparent supply chains”* (Bastian & Zentes, 2013, p. 558).

Other than mitigating the problem mentioned above, transparency also has other positive effects such as, increased trust and possibility for network-based process and product innovations (Bastian & Zentes, 2013). Moreover, transparency is a vital condition for establishing successful collaborative agreements and ensuring best practice SCM (Christopher, 2016).

In summary, the components of best practice SCM are highly relevant as the post-harvest loss of mango is a non-value adding activity which directly hampers the chain’s performance. With this in mind, Trienekens (2011) framework has been applied to the case of FPSC in Ethiopia. Furthermore, upgrading possibilities to improve the performance of the supply chain have been suggested later in the thesis. The upgrading options can contribute towards the reduction of post-harvest losses within the FPSC in Ethiopia. The next section will discuss the theoretical framework that has been applied to the relevant case.

## 3.0 Theoretical Framework

### 3.1 Background for the Theoretical Framework

In any business network, there are relationships and interdependencies between actors; both vertically and horizontally, which together incorporate the market composition. To analyse a targeted chain, one can utilize the value chain analysis (VCA) (Dekker, 2003). The VCA is a way to examine strategic improvement and was first introduced by Porter (1990). Porter argues for how the VCA can be used to examine all activities a company is conducting and how they are interacting with the other actors within the market composition, to identify sources for competitive advantages. Note that “the value chain is not a collection of independent activities but a system for interdependent activities” (Porter, 1990), which is equivalent to the reasoning behind SCM (Christopher, 2016).

Porter's VCA has received criticism for its lack of practical relevance, Lord (1996, p. 364) points to the lack of empirical evidence when implemented, thus it may be “a figment of academic imagination”. The VCA suggested by Porter (1990), Shank (1989), Shank & Govindarajan (1992) incorporate examining the vertical links within the composition, but narrow their scope around competitive advantages and costs. In other words, the focus of VCA is on the area within the supply chain where “costs can be reduced or differentiation can be enhanced” (Dekker, 2003, p. 5). To analyse supply chains of food specifically, adaptations of VCA have been developed.

The food value chain analysis (FVCA) is such a framework, which was developed to analyse the red meat industry in the UK (Zokaei & Simons, 2006). Zokaei & Simons (2006) framework implies reducing wastage within the whole targeted supply chain (thus, improving the efficiency) and refocusing the value proposition at the different stages to meet and exceed the actual customer demand. One of their key propositions is for the actors to understand the real and ultimate customer requirements, and realign the processes in the chain towards those requests.

However, the VCA and FVCA both lack the scope that captures the context present in a developing country.

In order to understand and analyse the case study - in its contextual surroundings, the Trienekens framework (2011) has been chosen and utilized, which will be further discussed below. The paper written by Trienekens offers an integrated approach on dealing with how producers from developing countries can enhance their performance by becoming; more efficient, value-adding, collaborative, accessing new markets, utilizing their business environment and identification of major upgrading opportunities - and who should facilitate such an upgrading? The Trienekens framework has been applied to the case of FPSC in Ethiopia, thus suggesting upgrading possibilities to improve the performance of the supply chain. This could ultimately lead to a reduction in the post-harvest losses of mangoes in Ethiopia.

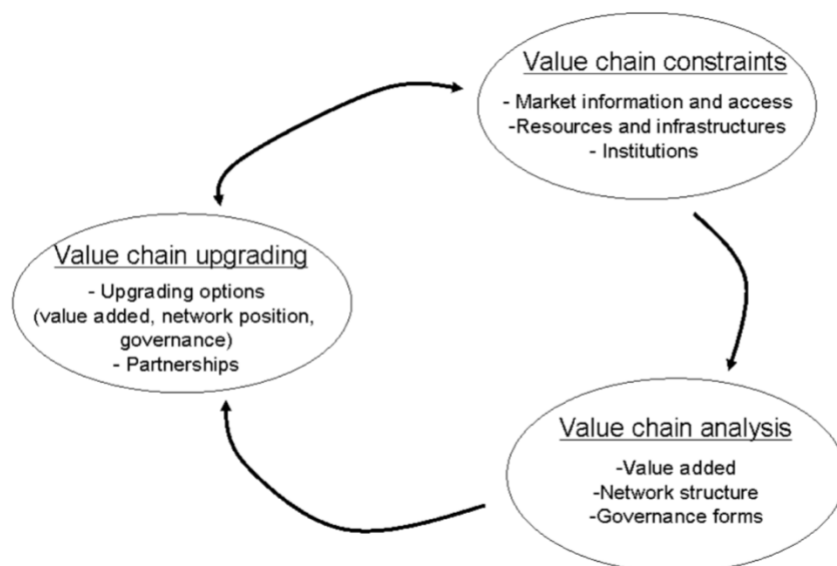


Figure 4 - The value chain analysis framework presented by Trienekens (2011)

Trienekens value chain analysis framework (2011) presented above (figure 4), consists of three components which incorporate three sub-categories. The first component is the value chain constraints, which examines market information & access, resources & infrastructure and institutions. The second component, the value chain analysis consists of value added, network structure and governance forms. The last component, value chain upgrading examines upgrading options in relation to the three elements identified in the value chain analysis. The following section will present an in depth description of the framework. The terminology used



by Trienekens is somewhat old-fashioned in some areas, for example, the use of systems instead of channels. However, since validating his framework is out of our scope, his terminology is used in the thesis.

### **3.2 Value Chain Constraints**

The phenomenon of globalization has expanded international markets globally, which for many actors in developing countries offers an opportunity to access emerging national and international markets. The most important challenge the developing countries' producers are concerned about is how to take part in these global value chains and improve their products, enabling them to compete in these markets. In other words, improving their practices in general. Therefore, taking part in these global chains requires the practitioners to adapt their practices; enhance quality and provide a cost-effective performance (Trienekens, 2011).

The purpose of any value chain "is to produce value added products or services for a market, by transforming resources and by the use of infrastructures – within the opportunities and constraints of its institutional environment" (Trienekens, 2011, p. 53). The three main constraints identified by Trienekens (2011) are; 1) Market access and market orientation, 2) Institutional voids and 3) Available resources and infrastructure. The three main constraints are discussed below.

#### **3.2.1 Market Access and Market Orientation**

In recent years emerging trends such as internationalization, volatile markets, market differentiation and more demanding customers have all led to increased complexity within supply chains. In light of these events, developing countries have experienced the emergence of distinct food sub-chains. The various chains have different but specific quality requirements dependent on the channel, such as the differentiation between; local, national and international markets (see figure below) (Trienekens, 2011). However, there are other significant factors that may affect the market configuration, but since some of them are overlapping, they will be discussed in a later section.

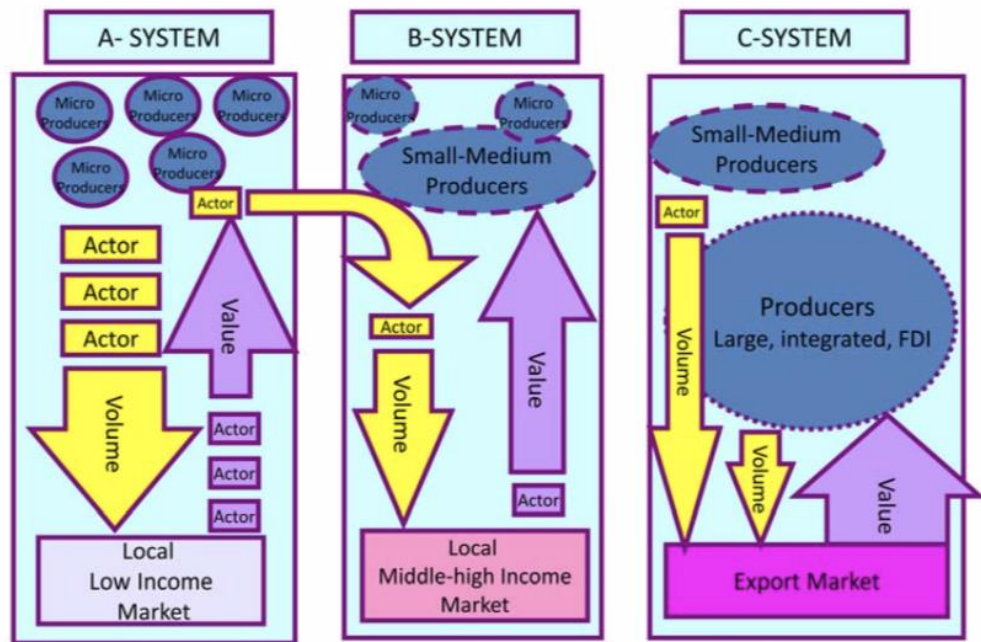


Figure 5 - The key distinction between the three systems: A, B and C (Trienekens, 2011, refers to Ruben, 2007, p. 27).

#### The A-system:

This system is in general characterized as the local low-income chain. Typical hallmarks and indications are small producers with complimentary small traditional production systems. The farmers are not characterised as “mass producers” – they produce smaller volumes where their products are typically being sold to a broker before moving further down the chain (Ferede & Gemechu, 2006). They are therefore characterised and named smallholders. Ethiopian smallholders sell 69% of their produce to private brokers. These chains serve the local market, but can also connect to low-end markets at other locations. However, this requires access and utilization of intermediaries and brokers, which again impose relatively long chains. As commonly accepted within supply chain management, longer chains indicate more complexity (Christopher, 2016).

In addition, it implies limited availability of market information from the end customer to the producer, obligations for handling and distribution between several actors and longer transportation distances between actors (Trienekens, 2011). The trademark of an A-system in developing countries is often its ability to deliver a severe amount of agricultural production volume but at a relatively small value.

Perishable goods such as mangoes can be featured in this channel, dependent on its quality.

#### The B-system:

This system is characterized as the local middle to high-income chain. The practitioners within this system are aiming at serving the emerging sector of supermarkets in developing countries. The volume of products delivered are supplied by the small/medium producers, often organized as cooperatives and/or through specific subcontracting agreements. Note that the micro-producers, as mentioned in the A-system, can also supply the same segment - but merely to balance supply and demand; often perceived as a buffer function.

Comparing the A-system with B, it is common to observe that even though the A-system delivers a higher production volume, the B-system generates a larger value. The B-system normally complies with national and occasionally international standards on quality and safety. Thus, enabling them to charge a premium and generate a greater profit. An example of such a system can be found in Kenya where the production of vegetables is for modern retailers in South Africa (Trienekens, 2011).

#### The C-system:

This system can be categorized as the export chain. Its only focus is to serve the export market, however in practice, it can be observed that low quality and rejected products from the C-system are sold at the national market. These chains normally operate with the reasoning behind economies of scale, are often collaborating more and are integrated with a small number of actors. Like the B-system, the C-system does not deliver the highest volume of products compared to local markets, but the value added is relatively high. The table grapes from South Africa is an example of a C-system (Trienekens & Willems 2007).

From the literature, in developing countries, market access and orientation plays a critical role in the FPSC (Aggarwal & Srivastava, 2016; Ferede & Gemechu, 2006;

Shukla & Jharkharia, 2013). De Boer and Pandey (1997) pinpoints how market orientation can affect the performance of a supply chain, which can explain some of the wastage within the supply chain.

The systems mentioned above are dependent on the market access and market orientation, however there are other factors affecting the composition and effectiveness of the systems. Hingley, Lindgreen, & Grant (2015) argue that the collaborative relationships between the actors within a channel influence the configuration, thus affecting the supply chain's overall performance. Therefore, collaboration is an important aspect within market orientation.

### **3.2.1.1 Collaboration**

The term collaboration has been used in different disciplines and is customarily used as a general descriptor for joint efforts (Soosay & Hyland, 2015). The rise of supply chain management emerged as a result of businesses realising that the competition in the market was no longer company versus company, but rather supply chain versus supply chain (Bhattacharya, Coleman & Brace, 1995). When referring to collaboration within supply chain management, we define it as two or more actors coming together to coordinate and adapt their business operations to improve the supply chain performance (Ralston, Richey & Grawe, 2017). This has further led to the importance of supply chain collaboration. Research on supply chain collaboration is a topic investigated by multiple authors. From the literature, there is clear evidence that there are benefits connected to successful collaboration within supply chain management (Barratt, 2004; Cao & Zhang, 2011; Grudinschi, Sintonen, & Hallikas, 2014; Zhou & Benton, 2007). Furthermore, Barratt (2004) supports the fact that supply chain collaboration can improve the supply chain's performance but substantiates that supply chain collaboration can be hard to implement successfully. Fawcett, Magnan, & Mccarter (2008) do further comply, but highlight that there are hindrances for successful implementation of supply chain collaboration; such as unwillingness to share information, lack of trust, and people within the supply chain.

Soosay & Hyland (2015) argue for the importance of information sharing, within effective supply chain management, but this might be hindered by the power dynamics. Furthermore, Hingley et al., (2015) argue for how inappropriate use of

power between actors leads to ineffectiveness and inefficiencies in supply chain. As most Ethiopian smallholders sell their products through brokers, they are faced with the issue of low bargaining power. The smallholders rarely have direct contact with the market and lose substantial revenue to the intermediaries as they lack price information and have limited transport and marketing options. This is an overlapping issue which will be discussed in detail later.

The characterisation of the three systems and their differences have been described above. Note that the different sub-systems are mainly independent, even though there are some relations; for example, when one system receives inputs from another to balance supply and demand. Ruben (2007) pinpoints how this weak connection between the sub-systems are contributing and prohibiting the development of equal quality and safety standards in the developing countries. In summary, one can say that a key condition for any actor is that they have access to both the market and market information, but also acquire the capability to act on this information. The more information the upstream actor receives on product quality and other product attributes, the more likely it is for such a chain to serve a heterogeneous market. Thus, producers from developing countries can capture larger values from different market channels by adopting a diversified production portfolio.

As described above, all supply chains are affected by their surroundings, thus, the market configuration influences a supply chain's performance. An important aspect within this configuration is the actor's ability and obligation to collaborate. Furthermore, the literature gives evidence on the importance of collaboration between the actors. This is important because there is a positive relationship between the supply chain's performance and how well the actors collaborate.

### **3.2.2 Resources and Infrastructure**

Regardless of a developing or developed country, an essential condition for any business practitioner is access to a market to be able to sell their products. The contextual settings surrounding these environments need supporting infrastructure and resources for these systems to work. According to Porter (1990), factor

conditions relate to the nation's inheritance with resources such as human knowledge, physical infrastructure and technology. These factors facilitate or constrain the upgrading of supply chains.

First of all, physical resources constrain supply chains from upgrading. These resources are often input supplies such as energy and water and are vital in any chain or company (Trienekens, 2011). The constraints can affect the chains both in terms of availability and costs. Countries, where energy is expensive, might limit growth possibilities for the chains or companies. Secondly, the location of the chain or company can affect their competitive position, for example, being located away from the downstream high-value markets may reduce your margins. Thirdly, access to educated labour and sufficient knowledge is a key factor for innovative behaviour in any chain. And lastly, the availability of technology which can be used in production and other business processes is important.

Utilisation of resources plays a crucial role in the losses of fresh produce during harvesting, post-harvesting and handling during transportation. Here, "utilisation" means that the actors possess knowledge and experience, but cannot utilise that information efficiently because the complementary resources required are unavailable. On the other hand, the resources may be available but the actor's ability to utilise them is missing. Ntsoane, Zude-Sasse, Mahajan & Sivakumar (2019) show that good postharvest techniques are unavailable or not easily available in developing countries. In Ethiopia, the supply chain is very simple with mostly subsistence level of cultivation, harvesting and post-handling techniques which limits the fruit's quality (Ssemwanga et al., 2008). Issues are also prevalent upstream related to grading and packaging. Sivakumar, Jiang & Yahia state in their article from 2011 that quality losses can also occur because of inadequate field handling, use of improper transportation and tight fruit packing.

Other than utilisation of resources, the presence of suitable communication and distribution infrastructure is a vital condition for supply chain upgrading and development. Unsatisfactory infrastructure suppresses vital flows of information between the market and the chain members, in addition, it hinders efficient flows of products.

Most developing countries face a problem with inadequate infrastructure. To improve conditions in rural areas, there is a need to invest large amounts to develop and extend road networks (World Bank, 2005). The government of Ethiopia has invested huge amounts on the construction of roads by formulating large scale infrastructure development programs since 1997 (Tegebu & Seid, 2017). However, the infrastructure is still developing throughout the country (Chao et. al, 2012). In order to accelerate the rate of market development, it is important for the public sector to support the private sector and collaborate. This can lead to a reduction in the barriers to market access and establish equitable relations between producers and intermediaries (World Bank, 2005). In their article from 2006, Viswanadham & Kumar argue for how poor infrastructure, lack of adequate cold-storage and transportation, especially in developing countries can lead to wastage in the FPSC. In the same manner, De Boer and Pandey (1997) found evidence suggesting that poor infrastructure can explain the inefficient performance of a supply chain.

In summary, the section above discusses the implication of resources and infrastructure as a constraining factor. The term “resource” is used in the same manner as Porter (1990) which is a broader term that incorporates elements such as human knowledge, physical infrastructure and technology. In general, when talking about the utilisation of resources, there are two issues that emerge. The first one discusses how actors possess knowledge and experience, but are not able to utilise that information efficiently. The second issue occurs when the opposite takes place. Furthermore, in order to efficiently upgrade and develop the supply chain, the presence of suitable infrastructure is necessary.

### **3.2.3 Institutional Voids**

When considering the business environment of any company and chain, one has to validate one more component; institutions. Institutions have the means to impact and affect organizational life and the environment surrounding an organization. Trienekens (2011) refers to how one can define institutions based on three distinctions; regulative, normative and cognitive. Regulative institutions contain legislation, policies and regulations from the government that has to be followed or act as a guidance. Normative institutions are found in business practices, policies and other ethical standards. Whereas cognitive institutions concern how different

individuals/groups perceive and understand the world surrounding them (Scott, 2014).

However, Trienekens (2011) points out that developing countries are often featured as institutional voids meaning “situations where institutional arrangements that support the market are absent, weak or fail to accomplish the role expected from them” (Mair & Marti, 2009, p. 419). Legislations and policies introduced and enforced by the government might hinder supply chain upgrading, for example, by setting trade barriers for production materials, the introduction of unfavourable taxes, hindering information flow between actors and inadequate investments in infrastructure etc.

It has been found that governments which support and facilitate innovation and upgrading, enhance development. Also, interaction with global value chains (GVC); standards, norms and regulations supported and regulated by local NGOs and governments set the institutional configurations for the producers (Dolan & Humphrey, 2000; Muradian & Pelupessy 2005; Perez-Aleman & Sandilands 2008). Thus, the global value chain is relevant to include in the institutional voids.

### **3.2.3.1 Global Value Chain**

There is a common understanding among scholars on the importance of learning and innovation, which are key drivers for competitiveness for firms, clusters, regions and arguably, nations (Pietrobelli & Rabellotti 2011). Likewise, the acceptance of how competitiveness is affected by a firm’s actions, attitudes, and other contextual settings are acknowledged. The global value chain are relevant for “institutional voids” because they affect the contextual settings, impact organisational life, environment and other supply chain within the market configuration. Furthermore, Morrison, Pietrobelli & Rabellotti (2006) state that developing countries through participation in globalization and thereby connections to the GVC, can significantly enhance their access to technical knowledge and increase learning and innovation. They further pinpoint how the interaction between global and local practitioners in developing countries can result in innovation and learning for the actors. There are several internal factors within the GVC which are engaged in enhancing the development of a particular supply chain.



*“For firms in developing countries inclusion in GVC not only provides new markets for their products, it also plays a growing and crucial role in access to knowledge and enhanced learning and innovation.”* (Pietrobelli & Rabellotti, 2011, p.1261)

Another factor that needs to be mentioned and has the means to affect organizational life is cooperatives. As established earlier, cooperatives can influence the market configuration and are therefore relevant in the case of institutional voids. Furthermore, the literature argues that collective actions can be regarded as a “tool” to improve market access for smallholders in developing countries (Belay & Ayalew, 2019; Francesconi & Heerink, 2010). According to Francesconi & Heerink (2010) agro-commodity commercialisation possesses the ability to both reduce poverty and enhance the economy in Ethiopia. However, they further pinpoint that high transaction costs and price volatility has hindered the desired outcome with support from Gelaw, Speelman & Huylenbroeck (2017). As expressed above, the establishment of institutions, collective actions and/or cooperatives, such as commodity exchanges, possesses the ability to reduce the high transaction costs in the agricultural markets of developing countries and thereby increase their overall performance.

In this section, we have defined and established the importance of institutions in relation to its business surroundings. Also, developing countries are said to be characterised as institutional voids which hinder and prohibit supply chain development and performance. With this in mind there are other factors that will, in relation to institutions, affect the business surroundings such as the GVC and cooperatives. The GVC's presence may impact the local supply chain's performance positively by developing the surroundings and relations between actors. As most smallholders in developing countries are operating under institutional voids, cooperatives present an option of managing and altering these surroundings in a manner that provides a solution for the institutional voids. The next section examines the components within the value chain analysis.

### **3.3 Value Chain Analysis**

As argued earlier, Trienekens framework (2011) is suitable for value chain analysis in developing countries and its contextual settings. In relation to the component

“value chain analysis” there are three subcategories which need to be examined; 1) Network structure 2) Value added and 3) Governance structure. These three components of value chain analysis will be discussed in detail during the explanation of the framework below.

### **3.3.1 Network Structure**

A network structure usually has two dimensions, horizontal and vertical (Christopher, 2016). In terms of the classification, there is a need to analyse the network structure of interrelationships between horizontal and vertical dimensions within the targeted supply chain. When products flow from the primary producer to the end consumer, it is referred to as a vertical dimension (Trienekens, 2011). However, the relationship between the actors at the same stage of different chains is reflected by horizontal dimensions (Trienekens, 2011). The supply chain or value chain is an example of a vertical dimension and the relationship between farmers is an example of horizontal dimensions.

The structure followed by a network is broadly dependent on the market channels chosen by different participants. A marketing channel can be defined as a value chain that forms a channel for products that are expected to be sold at a certain market (Trienekens, 2011). Thus, a marketing channel helps in reducing the gap between producers and the market. In our case, the producers can be regarded as the farmers who want to sell their products in the local market, or to someone who will further sell in the global market. However, the choices regarding different channels can be heavily constrained by limitations connected to market access. These limitations can be in the form of poor infrastructure to reach markets, specific requirements from the market such as quality standards and no access to information regarding price and demand.

Concerning the solution for the above limitations and problems, the framework suggests that horizontal collaboration and information exchange using communication of knowledge and joint investments can enable participants within the chain to overcome the challenges (Trienekens, 2011).

### 3.3.2 Value Added

Value addition can take place at different stages and by various actors throughout the supply chain. Value addition may be related to costs, quality, delivery times, innovativeness, etc. One important thing to note in the process of value addition is that the size of value added is determined by the end customer's willingness to pay (Trienekens, 2011). Value addition might seem like a good opportunity for the actors to diversify, but it can depend on a number of factors such as technological capabilities, availability of resources and market characteristics. We will be analysing how value added activities can benefit or hinder the targeted actor within our observed supply chains later.

According to Kaplinsky (2000), access to high value-adding activities is possible mainly through participation in GVC's which aim at markets requiring products with high-value addition. However, when it comes to commodities with low-value addition, the trade requirements and terms of trade in Western countries are following a downward trend (Kaplinsky, Morris & Readman, 2002). The upstream part of most international supply chains is usually located in developing countries, which explains why low value-adding activities take place in developing countries (Trienekens, 2011).

When we talk about value addition in food production, it focuses mainly on the quality and safety of the products. Quality can be divided into intrinsic and extrinsic characteristics. Intrinsic characteristics refer to the characteristics of the product itself, like, colour, tenderness and taste. Whereas, extrinsic characteristics refer to those aspects of the process which cannot be measured on the physical product, like; organic or fair-trade production (Trienekens, 2011). Recently, there has been an increase in standards that combine intrinsic and extrinsic characteristics, for example, requiring high quality and sustainably grown products in the western markets.

However, small and medium-size producers can find it difficult to access the markets due to the strict standards mentioned above. Compliance with standards involves high certification and monitoring costs (Trienekens, 2011). Thus, they can act as significant barriers to entry for small and medium-size producers. Although,

the inclusion of small-holders has been observed in some cases through food industry programs or cooperative governance forms (Trienekens, 2011).

As discussed earlier, there is an overlap between some of the categorisations, which was observed in the “value added” and “governance” sections. Distribution of value addition across various actors is connected to information asymmetry among different stages of the chain, bargaining position of actors and the governance form followed throughout the chain. Even though involvement in a GVC can bring a larger share of value adding activities to producers in developing countries (Nadvi, 2004), “*prices in Western markets do not automatically translate into prices for developing country suppliers*” (Trienekens, 2011, p. 67). This is mainly because small-scale producers are heavily dependent on downstream parties in the chain for credits and input supplies on one hand, and market access on the other. However, trust can prove to play an important role in forming collaborative agreements between small-scale producers and other actors. In many supply chains, reputation and trust can replace other governance mechanisms and act as a safeguard against opportunistic behaviour (Trienekens, 2011). This will be discussed in detail in the next section.

### **3.3.3 Governance Structure**

This section will discuss the governance of relationships between the actors within a supply chain. Firms operating within a supply chain are associated through a variety of relationships, i.e. forms of governance. These relationships can be distinguished into the transaction cost perspective and the global value chain perspective (Trienekens, 2011).

The transaction cost perspective is the one that targets the governance of transactions in vertical relationships among firms (Rindfleisch & Heide, 1997). Within this perspective, transactions between firms are conducted under conditions of opportunism and bounded rationality of the participants involved (Trienekens, 2011). It is very important to monitor transactions regularly throughout the value chain. However, in developing countries, exchange of information regarding transactions is disrupted due to information asymmetries and lack of adequate communication infrastructure, which makes it difficult to monitor transactions (Trienekens, 2011). The framework states that introduction of quality standards can

lead to increased monitoring by the lead firm, which in turn integrates governance within the value chain, thereby reducing the uncertainties mentioned above (Trienekens, 2011).

The global value chain perspective focuses on the lead firm, power relationships and distribution of value adding activities (Gibbon, Bair & Ponte, 2008). Suppliers can roughly be ranked from commodity suppliers, which follow an arms-length market relationship, to turn-key suppliers, that deliver customer-specific products (Trienekens, 2011). When talking about commodity suppliers, power balance and information asymmetry are mostly favourable for the supply chain partner in a developed country. However, horizontal relationships, particularly farmer cooperatives can increase the bargaining power of smallholders and decrease the transaction costs for retailers when purchasing from small farmers (Trienekens, 2011).

The next section will debate the last component of Trienekens value chain framework (2011); value chain upgrading.

### **3.4 Value Chain Upgrading**

Gereffi (1999, p. 51-52) defines upgrading as: “.... *a process of improving the ability of a firm or an economy to move to more profitable and/or technologically sophisticated capital and skill-intensive economic niches.*”

Trienekens (2011) approach on value chain upgrading is developed based on other researchers' conclusions pointing at different directions one can take in upgrading. In general, they are all an adaptation of how to achieve upgrading through multiple business aspects. Examples could be; keeping a focused scope around both product and process upgrading as well as collaborative product upgrading and at the same time contractual arrangements.

The upgrading options presented are the same categories as investigated in the value chain analysis section; value added production, value chain-network structure and governance structure.

### 3.4.1 Upgrading of Value Added Production

In terms of the upgrading of value added production it can happen in various forms:

- Upgrading of products and packaging
- Upgrading of processes
- Functional upgrading which might occur when insourcing production or in distribution functions
- Intersectoral upgrading; occurs when chain practitioners implement value added processes from other sectors and offer new services or products. E.g. Coffee farmer who opens up for tourism activity.

In developing countries, value chain's product and process upgrading seems like the most common upgrading option. Whereas, functional and intersectoral upgrading occurs less often as the developing countries are commodity suppliers to developed countries' supply chains. As mentioned before, a key issue for developing country producers is functional upgrading. For example, to perform value adding activities in developing countries instead of just being commodity producers of products that are upgraded in the country of the Western customer. Apart from the production stages of the value chain, functional upgrading can also take place in intermediary functions, such as in the export sector, where exporters can achieve a role in collection, category management, packaging and sales of products.

Previously in the theoretical framework, it has been argued that participation in a global chain can increase the performance of a local actor in a developing country. However, when firms cooperate in such a close relationship, it might hinder functional upgrading in addition to inducing independence towards a small number of significant customers (Giuliani, Pietrobelli & Rabellotti (2005), referring to Humphrey and Schmitz, (2002b))

The development and upgrading of value added in products is always connected to the demand in the market. There are two main product attributes that can be added: intrinsic; product quality, packing etc and extrinsic; in relation to process characteristics. In western and more developed countries there has been a greater focus on the extrinsic characteristics as their focus is on sustainability and CSR (Corporate Social Responsibility), thus enforcing companies to do the same.

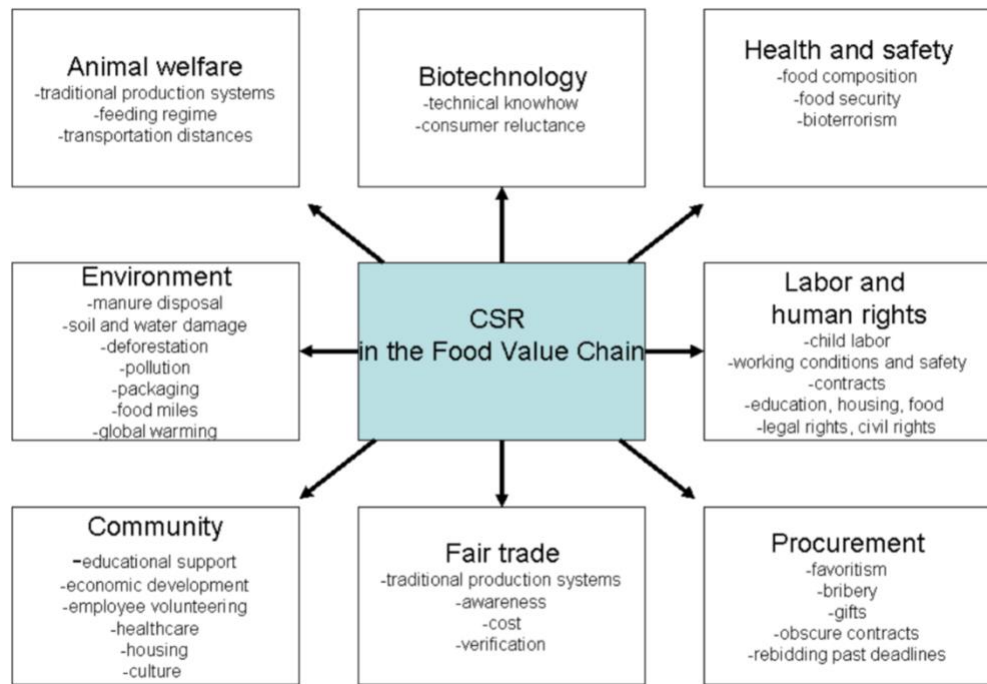


Figure 6 - The key dimensions producers and supply chains can focus on when upgrading extrinsic product attributes (Trienekens, 2011, refers to Maloni & Brown, 2006, p. 38)

On the other hand, process upgrading is dealing with upgrading the product, effectiveness of production and distribution processes. In terms of optimizing processes, one can often find that this is where the innovations and introduction of new technology appears.

As mentioned earlier around the key issue of functional upgrading, there is a loss in value for the practitioners in the developing country as they are serving as a commodity supplier. Nonetheless, some primary processing activities such as assembly of cars and processing of fruit juices have moved to these countries. However, marketing and specialized processing are still often located in developed countries. To enable developing countries to capture a bigger part of this profit, it has to be facilitated for them - this will be further discussed in other parts.

### 3.4.2 Upgrading of Value Chain Network Structure

When concerned around upgrading of the network structure, it refers to both horizontal and vertical relationships in the chain. Upgrading the vertical chain is often connected to changing or getting access to the right market channels

(Trienekens, 2011). For developing countries this is challenging, and this does not automatically mean that they should do business with Western companies. They should approach market channels that are easily accessible, such as emerging markets, for example, South Africa, Asia and South America.

Horizontal upgrading is concerned about how horizontal collaboration can increase their performance; through joint purchasing, shared facilities, joint marketing etc. Bear in mind that horizontal upgrading in its most advanced form (best practice), enables product differentiation, combined with value adding activities alongside other sectors (inter-sectoral upgrading). Research on upgrading is often concerned with horizontal upgrading focusing on the introduction of producer associations and/or cooperatives (Trienekens, 2011).

### **3.4.3 Upgrading of Governance Structures**

The supply chains we observe nowadays have the tendency of being shorter, that is, having fewer actors in the chain due to the realization of excessive intermediaries between the practitioners in the upstream to the downstream parties. As a result, one can observe transformations in the developing countries where export-oriented producers are now producer-exporters. Subsequently, their chain might (not) have lower transaction cost, reduced handling and possess more control over their own supply chain (Trienekens, 2011)

Governing these “modern” chains requires investments to enhance quality, delivery consistency and delivery uncertainty. Moreover, increased collaboration between the practitioners of the supply chain can facilitate better information and product flows and increase the chain's market power. Standardization and certifications in food chains are particularly important factors in business relationships between actors and are often included in contracts.



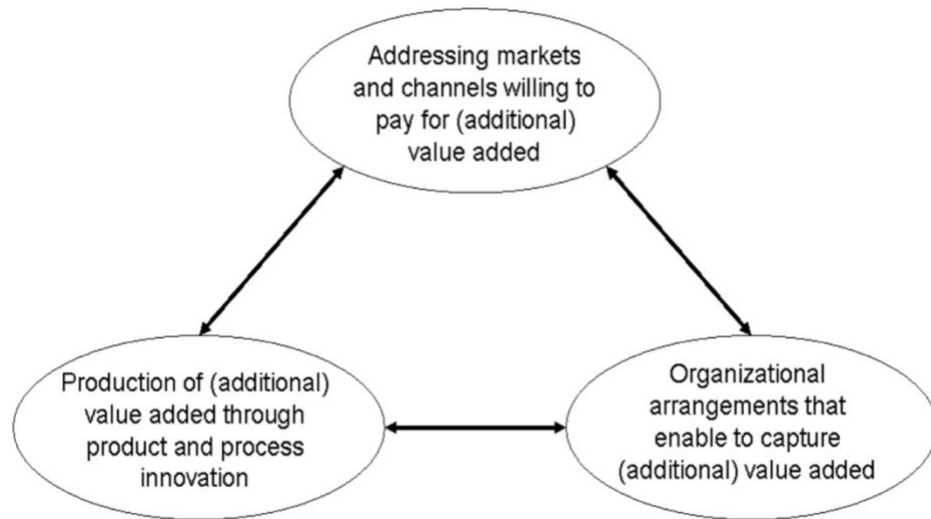


Figure 7 - Developing country value chain upgrading options (Trienekens, 2011)

The three options in figure 7 are closely connected and can to some extent be perceived as synergies of each other. It is important to note that the governance structure controls and decides the distribution of value added over the various actors in the supply chain. Arrangements between the practitioners of a chain are linked to power relationships in the supply chain, thus determining the market which is addressed. Furthermore, production of value added is only suitable if there is a market which has a demand for it.

## **4.0 Methodology**

In this section, the research methodology used to answer the research question has been discussed. The research strategy, research design, collection of data and data quality has been elaborated. The discussion also includes the reasoning for choosing various methods.

### **4.1 Research Strategy**

The two main research strategies described in Bryman & Bell (2015) are quantitative and qualitative. The basic difference between the two is that quantitative research employs measurement, numbers and analysis of those numbers, whereas qualitative research usually focuses on non-numerical data.

A qualitative approach is suitable for our research because it provides a detailed description of the circumstances and acts as an illustration for practitioners wanting to reflect on their own work (Silverman, 2016). Qualitative research refers to finding the meaning, concepts, definitions and description of things along with others (Berg, 2013). Taking the research question into consideration, qualitative research enabled us to understand and gain knowledge about the circumstances leading to wastage of mangoes in Ethiopia. Following a qualitative approach also helped in developing a thesis that can act as an illustration for other practitioners who are interested in conducting similar research.

Following an abductive approach is the most well-suited approach to support the qualitative research. Abductive reasoning starts with a puzzle and then tries to explain it. It also involves identifying conditions which would make the phenomenon less puzzling (Bryman & Bell, 2015). Abductive reasoning is also said to overcome the limitations associated with deductive and inductive reasoning. The deductive approach focuses on developing propositions with the help of theory and then makes them verifiable in the real world. Whereas, an inductive approach relies on the theory which is methodically generated from data (Dubois & Gadde, 2002). Also, the abductive approach is seen as systematic creativity in research which can be used to develop new knowledge (Kovács & Spens, 2005).

Since the thesis focuses on discovering and exploring new findings along with new relationships between the farmers and brokers, an abductive approach is the best-suited approach for our research. To substantiate our use of the abductive approach, the thesis began with a puzzle - the problem statement - which was explained with the help of theory and findings from the research trip. Occasionally, there was a need to adapt the research strategy during our research trip due to new discoveries. A detailed research strategy has been presented in Appendix 9.2.

#### **4.2 Research Design**

Research design describes the criteria used when assessing business research. “It provides a framework for collection and analysis of data with the purpose to serve both the explicit set of criteria and the overall chosen research question” (Bryman and Bell, 2015, p. 48-49). In other words, the research design determines the bearings of how the execution of the research method and analysis of the data is to be conducted. Bryman and Bell (2015) highlight five distinct research designs: experimental and related designs, cross-sectional design, longitudinal design, case study design and comparative design.

The case study discussed in the thesis focuses on the issues concerning wastage within the FPSC in developing countries and suggests appropriate solutions according to the contextual background. As the research was conducted by investigating a specific location - Ethiopia - and product - mango - in the view of a supply chain, it is reasonable to use a case study design. Ethiopia is suitable for our case study as the country's GDP is highly dependent on the agriculture industry, which has issues such as geographical separation between markets and suppliers. However, it is a country that is currently developing, thus improving both their economic situation and infrastructure. According to Bryman and Bell (2015), a case study design should be used when examining the detailed and intensive analysis of a single case. Furthermore, a case study distinguishes itself from other research designs due to the narrowed scope on a system or a situation, the purpose of an entity and a part's function (Bryman & Bell, 2015). Using a case study to answer our research question enabled us to delineate our scope, gain in-depth experience and information within our research field.

In order to interact with different groups of farmers in Ethiopia, a collaborative partnership with africaJUICE was developed to access their supplying farms operating in Ethiopia. africaJUICE is a company that is on track to becoming a major producer and exporter of fruit juices from Africa, in particular Ethiopia, even though 2/3rd of their products are sold locally. In order to interact with the relevant practitioners concerning the post-harvest losses of mangoes, a collaborative agreement with Jimma University was established with the help of the SUSTAIN project. More information on the SUSTAIN project can be found in appendix 9.5. Furthermore, to gain insight on how cooperatives operate in Ethiopia, interviews with ECX and AAA were conducted to understand the functioning of different cooperatives.

A case study does not automatically indicate a qualitative research strategy, thus exponents of a case study design frequently favour qualitative methods (Bryman & Bell, 2015). At the same time, a case study offers a level of flexibility that is not readily granted by other qualitative approaches (Hyett, Kenny, & Dickson-Swift, 2014). As an abductive research design was followed, flexibility served the research as an advantage. However, Hyett et al. (2014) argue how flexibility can also result in critics questioning the use of a case study.

Moreover, in the view of “level of analysis”, it is necessary to consider which levels are to be the primary measurement and analysis (Bryman & Bell, 2015). The SOGI model is commonly referred to when assessing differences in the level of measurement and analysis representing: societies, organizations, groups and individuals. During the research and analysis, a combination of data from several levels was used, with a main focus on the organization and society. This provided insights into the reasons for severe wastage in the FPSC within the Ethiopian society. Furthermore, it supports Bryman and Bells reasoning around a case study; “Intrinsic case studies are undertaken primarily to gain insight into the particularities of a situation, rather than to gain insight into other cases or generic issues” (Bryman & Bell, p. 68, 2015).

#### 4.2.1 Case Boundaries

The case boundaries dictate the constraints related to the case as a result of the reasons mentioned below. It is important to note that most of the case boundaries were concerned with the research trip.

The first boundary concerns the geographical area under consideration in Ethiopia. Due to the safety concerns in the country as a result of political disruptions, the research had to be restricted within the areas of Addis Ababa, Jimma and Upper Awash as shown in illustration 1.



Illustration 1 - Map of Ethiopia; Red circles represent the cities visited during the research trip

The safety concerns led to the second case boundary which was related to the research trip. Ethiopia was supposed to have their general elections in May 2020. Previously, there have been riots during the election period, which has led to volatile and unstable conditions for foreign visitors. Since the elections were to be conducted in April-May, the research trip had to be moved to February, 2020.

The focus on harvesting and post-harvesting activities can be categorised as the third case boundary. The research did not focus on pre-harvesting activities which may have accounted for some of the agricultural losses.

#### **4.2.2 Limitations**

The following limitations of the research have been identified. It is important to note that most of the limitations are associated with the case boundaries. Firstly, the focus had to be on a few local areas as mentioned above. Furthermore, the geographical area discussed in the thesis is located relatively close to the largest market in Ethiopia i.e. Addis Ababa. Whereas, the largest mango suppliers are located in north-western Ethiopia further apart from the main markets. It was not possible to broaden the research area to these localities in Ethiopia, thus restricting the research sample.

Secondly, the research trip took place before the harvesting season of mangoes, which of course limited our observations to some extent. Thirdly, issues concerning language were encountered, as some of the practitioners had limited English experience. For example, during the visit to Atkilt Tera market, it was difficult to communicate efficiently with the retailers which created a hindrance (AT, 2020). Fourthly, there were time constraints in Ethiopia as the research trip took place for two weeks due to the case boundary mentioned above. As a result, the research has a biased sample of global chains - solely africaJUICE - as it was not possible to interact with other global chains within the time frame.

Fifthly, as a result of the uncertainty concerning elections in Ethiopia, data collection was restricted due to safety concerns in the country before the elections took place. This can also have an effect on the extended supply chain within and outside Ethiopia because of disruptions. Thus, the challenging context of gathering data was another limitation of the study. Since the research trip took place earlier due to the elections, the situation around COVID-19 was avoided. However, if another trip was required to collect more relevant data, it would not have been possible. The presence of COVID-19 has also affected the access to secondary data, as arrangements were made with the interviewed individuals and organizations. They were supposed to send more information after the discussions and interviews

during our trip. However, this did not materialize, as they had more than enough to handle during the COVID-19 pandemic.

### **4.3 Data Collection**

In this section, the process of collecting primary and secondary data has been elaborated. To assess the main variable; wastage within the FPSC for mangoes in Ethiopia, the reasons behind the wastage within the delineated case had to be identified. In addition, the identified reasons were analysed and put into context to reach a conclusion on how to improve the performance of the supply chain, thus reducing the wastage. To do so, both first-hand experience through primary data and support from secondary data was needed.

#### **4.3.1 Primary Data**

Bryman & Bell defines primary data as when the researcher who has collected the data also analyses the same data (Bryman & Bell, 2015). In other words, this typology provides us with first-hand data collection, which was combined with secondary data to improve and strengthen the research study.

To gain a deeper understanding of the case, it was important to investigate where and why the wastage occurred along the whole supply chain. There was a need for first-hand observations of the harvest and post-harvest practices, as well as interacting with key participants in the chain, wherever possible. Semi-structured interviews with the participants and other key individuals related to the delineated chains were conducted. Semi-structured interview refers to the context where the interviewer asks a series of general questions and has the possibility to ask further questions in response to the replies received (Bryman & Bell, 2015).

The semi-structured interview was conducted after developing a set of general topics and/or key issues; commonly referred to as an interview guide. This implies an informal interview style, with a variety of sequencing and phrasing of questions (Bryman & Bell, 2015). The literature, including the Trienekens (2011) framework encouraged us to investigate certain aspects related to the FPSC. These factors were used to create the interview guide which was used during the interviews. The

interviewees were asked questions from the interview guide. Based on the new findings from the discussions, follow up questions were asked to further investigate the identified factors. Such an approach corresponds to both semi structured interviews and abductive reasoning, which enabled us to proceed with the findings in a flexible manner. The interview guide can be found in Appendix 9.3.

The primary data collected includes the debates from the interviews with three experts from africaJUICE, three experts and students from Jimma University, one representative each from AAA and the ECX.

africaJUICE aims to demonstrate that foreign investment in developing countries can lead to growth, positive effects on the environment and poverty eradication (Africa Juice, n.d). africaJUICE is also committed to the principles of sustainable development and Fairtrade practices in their operations. At africaJUICE, 3 separate interviews were conducted with 3 experts which will be called AJ 1, AJ 2 and AJ 3 respectively, where AJ stands for africaJUICE.

Interviews and discussions were conducted with the faculty at Jimma university within the Business and Agricultural department. The Agricultural department in Jimma University was established in 1952 and has more than 4000 students and 500 staff as of February 2020. In total, we had interviews with 3 experts which will be named JU 1, JU 2, and JU 3 respectively. JU 1 & JU 2 were interviewed together as a group whereas JU 3 was interviewed individually. Our interviews revolved around a lot of issues concerning the FPSC. Some of the major issues discussed were post-harvest management, the role of intermediaries, infrastructure, existing practices and farmer cooperatives.

The students from Jimma University will be referred to as “stud” in the text when they are cited. A brainstorming session with Master students at Jimma University was conducted in order to gain insights regarding our framework and the issues identified within the supply chain. The group was a mix between SCM and MBA students studying in the 1st and 2nd year. Some cultural differences and language barriers were observed as the participants were hesitant at first but became comfortable later on during the interaction. The session revolved around the framework and the issues which were identified after analysing the literature.



Interviews were conducted with the representatives from AAA and ECX, which are two cooperatives operating in Ethiopia. The representative from AAA will be cited as AAA 1 in the text whereas the interviewee from ECX will be cited as ECX 1. Primary data was also collected through general observations made during the research trip, which will be cited as GO.

Furthermore, with the literature review including Trienekens (2011) framework in mind, the following variables have been investigated:

- Handling of the produce
- Technology usage and availability
- Lack and use of infrastructure
- Geography; distance and climate
- Collaboration in the chain
- Degree of communication and information
- Power structure within the chain
- Contextual settings

Moreover, the primary data collected helped in mapping the whole supply chain. In other words, the steps of the whole chain had to be explicitly comprehended as the actors had limited information regarding their products before and after handling.

#### **4.3.2 Secondary Data**

Secondary data refers to data collected by other researchers, organizations or businesses and are used by researchers who did not conduct the data collection themselves (Bryman & Bell, 2015). The use of secondary data collection presents several benefits for the researchers such as cost and time savings, maintaining and displaying high-quality data and opportunities for cross-cultural analysis. Earlier research done by different scholars or researchers also generates a reviewed approach on the conducted literature. However, there are some pitfalls connected to secondary data that need to be considered and avoided, such as; lack of familiarity with data, the complexity of data, lack of control of data quality and absence of key variables (Bryman & Bell, 2015).

Secondary data from the literature has been used, to recapture and connect the key elements related to the research. At the same time, we wanted to gather data from other participants in the chain. However, this proved to be somewhat difficult. The data should have given an overview of the overall wastage, and hopefully, pinpoint certain levels where the wastage originated from. The thesis was supposed to include secondary data collected from similar geographical areas which struggle with the same issues; such as data on FPSC within other developing countries. As explained above in the limitations section, COVID-19 has affected our ability to do so.

#### **4.4 Data Quality**

In order to ensure that the conclusions drawn from the research are correct and credible, a high degree of quality is very important. Reliability and validity are important criteria to ensure the quality of data in quantitative research. However, when it comes to qualitative research, researchers have argued that qualitative studies should be judged on the basis of different criteria than quantitative research (Bryman & Bell, 2015). Thus, Bryman & Bell have suggested alternative criteria for evaluating qualitative research which are discussed below.

##### **4.4.1 Credibility**

According to Bryman and Bell (2015), it is because of credibility that a study is accepted by other researchers. Credibility makes sure that the research is carried out with good intentions and reflects that the researcher has clearly understood the subject that he is doing a study on (Bryman & Bell, 2015). The credibility of a study can be improved by a method called triangulation. Triangulation is a process which compares the results obtained from different data collection methods or data sources (Mays & Pope, 2000). The logic behind triangulation is that a single method cannot adequately give the solution to a problem, multiple methods provide more resources for the research (Patton, 1999). Thus, triangulation has been applied to make the study more credible by using different data collection methods such as, individual interviews, group interviews, workshops and observations. The results obtained through different data collection methods and the literature were very similar, thereby, increasing the credibility of the research.

#### **4.4.2 Relevance and Reliability**

A study can be termed relevant if it adds to the existing pool of knowledge or increases the confidence in current knowledge (Mays & Pope, 2000). In recent years, there has been an increasing focus around the term sustainability. The dual adaptation of UN's SDG's, realisation of the importance of planetary boundaries and the Paris Climate Agreement, represents a global paradigm shift towards a more sustainable future. However, to reach these desired goals and agreements one has to practically implement the severe and complex solutions. The research will definitely add to the existing pool of knowledge as practical sustainability aspects connected to food security and supply chains in developing countries have been debated and discussed.

On the other hand, the methods being used have to be reliable because studies which use reliable methods are thought to depict an actual representation of the natural world (Collingridge & Gantt, 2008). Thus, in a qualitative sense, reliability refers to adopting research methods that are acknowledged by other researchers in the same field. Since this research has used a case study design and collected primary data, this representation is reliable and gives an actual depiction of the case.

#### **4.4.3 Transferability**

In Bryman & Bell (2015), they say that transferability in qualitative research is equivalent to external validity in quantitative research. They define external validity as the degree to which a researcher can generalize his findings across social settings. On the other hand, transferability refers to a situation when readers feel that they can transfer a study or research to their benefit because it is very similar to their own situation (Tracy, 2010). Thus, the aim of a researcher should be to write a study which can be used by other people who are facing a similar situation. However, it is not possible that a study can provide findings that are universally transferable, irrespective of the method used (Malterud, 2001). To solve this problem, Bryman & Bell suggest that when doing a qualitative study, researchers are suggested to follow a thick description. The thick description includes rich accounts of the details of a study. This helps in creating a database for other researchers which they can use to determine whether the study is transferable or not.

When interviewing the experts at Jimma University, they mentioned that our research can also be applied to other climacteric fruits as they have very similar characteristics when it comes to post-harvest losses (JU 1 & 2, 2020). The actors within the supply chains of climacteric fruits follow a similar approach, thus substantiating the transferability of our research. Furthermore, Ethiopia is a developing country with encompassing contextual configurations which can be applied by other scholars conducting research in similar settings. However, not all developing countries have had the same level of development over the years. The development in Africa, including Ethiopia, has been lagging behind other developing countries, for example, Vietnam and Thailand. Thus, the research might not be transferable among all the developing countries. The factors that have constrained these developing countries have also been different, for example, corruption and the composition of the market configuration.

## 5.0 Findings

### 5.1 Introduction

This section exhibits the findings gathered and observed during the research trip to Ethiopia. The sections include the debates from our interviews with three experts from africaJUICE, three experts and students from Jimma University, AAA and the ECX. The actors have been randomly assigned “He” or “She” when referred to in the section. Other than discussions with relevant actors, the findings also include the general observations (GO) made during the trip and information gathered while visiting the Atkilt Tera (AT) market. It also includes the secondary data gathered from the practitioners at Jimma University. In the sub-sections below, eight categorisations have been identified, which are relevant actors within the observed supply chains.

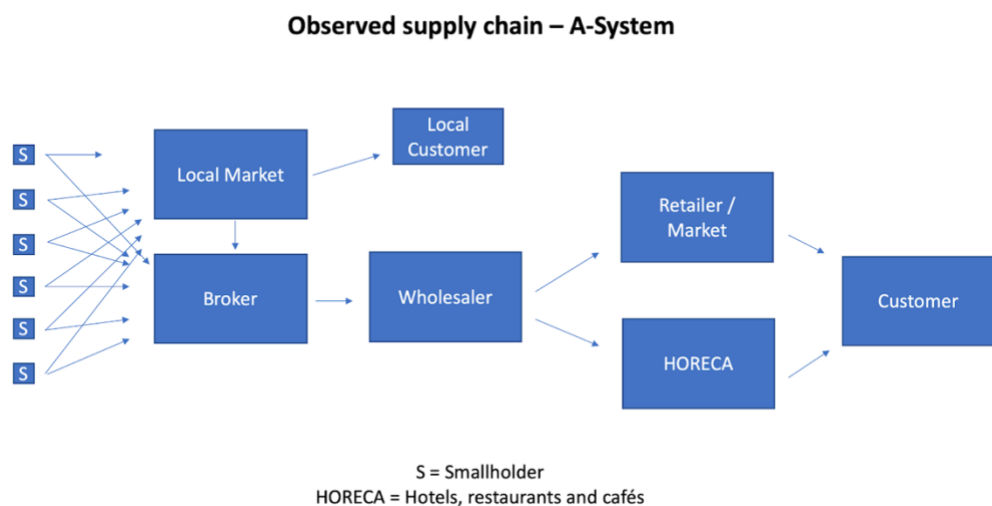
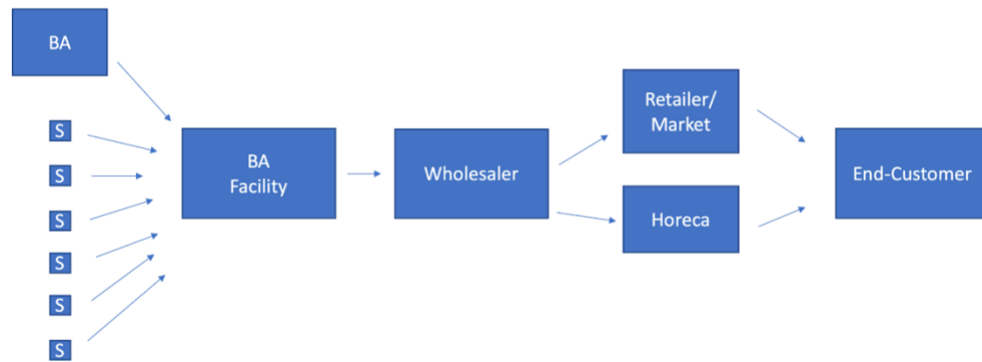


Illustration 2 - depicts the A-system

Two different supply chains were observed during the research trip. Illustration 2 depicts the A-system supply chain which is followed by most of the smallholders. Illustration 3 depicts the chain with a combination of both the B & C-system, which is the chain associated with africaJUICE and will be discussed in section 6.2. Furthermore, in illustration 3, both the big actor as well as the smallholders are a part of the chain.

### Observed supply chain – B & C System



BA = Bigger Actor, S = Smallholder  
BA Facility = Bigger Actor's facility

**Note:** The end-customer can be either in the local market or in the export market

Illustration 3 - depicts the observed chain where the combination of B & C-system were present

## 5.2 Smallholders

The findings discussed in this section align with the literature, where the smallholders are smaller actors with limited land, produce and agricultural equipment. The representative from AAA advocated that the small farms are mostly family-owned and passed on from father to son. Furthermore, the knowledge concerning agricultural practices is also passed on from one generation to the other. Their post-harvest practices follow the traditional methods which can be inefficient considering modern methods. However, some of the practices are still relevant and followed by bigger actors, but the losses can be reduced by following modern techniques and continuously improving them. The position of smallholders in relation to the rest of the system is depicted in illustration 2 & 3.

AJ 1 explained that crop rotation was very common among the local smallholders. Crop rotation is a technique that can be used to maximize yield and minimise diseases. Thus, this was a positive sign which pointed out that the farmers did possess the necessary knowledge around agricultural practices. In general, according to AJ 1, “there is also a need to address the issues concerning lack of cash, capital and manpower among the smallholders.” However, one of the main issues faced by smallholders was the unavailability of products supporting agricultural activities such as fertilizers and pesticides, which led to losses. Due to unavailability of fertilizers, the farmers used the same product for all crops instead of using the recommended fertilizer. This also gave the traders an opportunity to

charge extra for agricultural products which were not readily available. AJ 1 pointed out that the farmers do not have access to communication infrastructure, such as the internet. This makes it difficult for them to collect information regarding the current prices in the market. As a result, the intermediaries exploit them by paying a very low amount for their products. Due to the low cost price, the intermediaries do not have an incentive to avoid wastage as they do not incur any major losses if the products are wasted.

The main reasons behind lack of investment in new equipment by smallholders were also pointed out by AJ 1. The first reason is the lack of capital or cash with the small farmers. They do not have a lot of cash in hand throughout the year which makes it difficult for them to invest in equipment. The second reason is a problem of monopoly as one trader was responsible for collecting products from a particular area of small farmers. As a result, the intermediaries dictate the market price and can pay the price that is suitable for them. This leads to uncertainty in the price offered by intermediaries to the farmers. The third reason is lack of incentive as the farmers received the same amount from the brokers irrespective of the quality of their products. Therefore, the farmers had no incentive to invest in new technology as they are uncertain if their investment will give any return or lead to an increase in their revenue.

According to JU 2, most of the actors were aware that infrastructural resources can improve their performance, however, there was a lack of capital and banking facilities available to smallholders.

Concerning the appropriate use of fertilizers, AJ 2 explained that the smallholders kept using the same type of fertilizer or fungicide for a disease because of which the disease would develop resistance towards the treatment. Also, they did not apply the fertilizers for the recommended duration which further put their crop in danger. Thus, the smallholders did not use the adequate solutions concerning fertilizers.

During the brainstorming session with the students, new issues faced by smallholders which were not present in the literature were discussed. For example, the students explained that monkeys and apes usually like to consume mangoes. As a result, they were a huge problem for the farmer before harvesting as they used to

consume and spoil the fruits. However, this was a problem faced by the farmer that was mostly pre-harvest.

### **5.3 Bigger Actors**

The bigger actors are characterised as having higher market power and fewer actors involved within their supply chain. They are depicted in illustration 3 because they can be present as 1) B-system 2) C-system or 3) a combination of B & C-systems; the one we interacted with was a combination of both the systems. Furthermore, they have considerable resources along with the ability to adapt and educate themselves.

During the interview with AJ 1, he explained the reason behind choosing Ethiopia to start africaJUICE. The reason was that they had some history with biofuel work in Ethiopia, which allowed them to develop connections and traction. After relevant investigation and research around the agricultural industry, they decided to start operations in Ethiopia. Furthermore, he mentioned that around 1500-1600 workers are employed at the farm and 50 at the factory. Out of the employees working at the farm and management positions, almost 50 % are women. The main crops grown at the farm include papaya, mango, passionfruit and maize. They also have rotational crops such as watermelon beans and chillies, which were mainly used for rejuvenating the soil and having a continuous flow of income. An interesting thing pointed out by AJ 1 was that the maize grown by them is distributed among the workers as ration at cost price, enabling the employees to save money on food. Other than being used as ration, the maize also acts as a wind barrier in some parts of the farm. During the interview with AJ 3, he specified that africaJUICE's farm was 1700 hectares with 22 hectares devoted towards mango production. In 2019, 300 tonnes of mangoes were produced from the 22 hectare land.

Regarding the operations at africaJUICE, AJ 1 explained that they sell their products to a wholesaler. The wholesaler sells the products to a retailer, who ultimately trades them in the market. AJ 1 pointed out that they had no control over the price set by the wholesaler, however, they regularly used different traders to encourage competition among them. Regarding the juice production, AJ 1 explained that they use passionfruit, papaya and mango for juice production.



However, most of the mangoes grown at their farm are not used in juices but instead sold directly as a fresh product, dependent on the economical return. During harvesting, the fruits are sorted based on quality as high-quality mangoes are sold in the market at a premium price whereas the low-quality fruits are used in the juice production. According to AJ 1, it is more profitable to sell the mango as a fruit, instead of processing it and selling it as juice. The price of the mangoes they sold in the market was more than the price they received for its juice.

AJ 1 mentioned that africaJUICE has trained their workers in order to not let the mangoes fall to the ground as it can lead to bumps, which deteriorate the quality of mangoes and make them difficult to sell, ultimately leading to wastage. They also avoided using wooden crates as they cause scratches and wounds on the fruit which can lead to spoilage. Instead, they have started to use plastic crates as they are easy to stack on top of each other and do not lead to wastage of fruits due to crushing or scratching. Other than reducing wastage within their own facilities, AJ 1 mentioned that they tried to reduce wastage among the smallholders around their area. For example, they bought mangoes from the neighbouring farms in the Upper Awash region that were not appropriate to be sold in the market. The reason was that when a mango has to be sold in the market, it needs to have certain quality standards such as having no deformities. When it comes to processing juices, the most important thing in relation to quality is the content inside the fruit. The fruit produced by the smallholder that does not fulfil the quality standards in terms of physical appearances would normally go to waste. However, as africaJUICE has the ability to process juice from these “low-quality” fruits, they acquired these fruits to be processed and sold as juice. They also shared knowledge with other smallholders about the techniques and fertilizers that can minimise wastage and increase efficiency.



Illustration 4 - Poor packaging (a) results in ripe fruits exhibiting damages and defects (b)

(Esguerra & Rolle, 2018, p. 16).

Furthermore, the importance of plastic crates can be seen in illustration 4. The secondary data obtained from Jimma university stated that “although more expensive than traditional packaging containers, plastic crates with long-term use (5-6 years), the packaging cost per kg of produce is relatively cheaper” (Esguerra & Rolle, 2018, p. 15).

Moreover, AJ 1 was asked to explain how africaJUICE had helped the local community and smallholders. According to AJ 1, they took actions which, in general, improved the wellbeing of local communities and also increased their competitive position. As an example, AJ 1 explained how africaJUICE together with the local authorities and the smallholders, invested in infrastructure and built a canal running through the valley where the facility is located. This has, of course, benefited all the actors related to it in the area. They have also built schools and clinics on their premises which can be used by anyone working on the farm at a subsidised rate.

When asked about innovation concerning farming techniques in order to reduce losses, AJ 2 explained that they focussed on continuously trying new things when it comes to pre-harvesting and post-harvesting techniques. They had different rows of fruits which had been grown under different conditions to assess which one was performing better. This was very important as they were able to increase their yield and efficiency because of the things they discovered by experimentation. This experimentation was lacking in small farmers as they could not afford to experiment with the crop they were growing. They did not have enough money or manpower and had to use every inch of their land in order to have a feasible livelihood.

When asked about africaJUICE’s focus on sharing knowledge, AJ 2 explained that when they identified a new disease, they would tell the surrounding farmers about the fertilizers that should be used to solve that particular disease. This is because africaJUICE had the resources and knowledge to deal with the new diseases which were absent in small farmers. For example, if africaJUICE can’t find a solution for a particular disease, they have the resources to send a sample of the disease or insect to a laboratory to get it analysed and find a suitable solution. AJ 2 mentioned that experts on harvesting techniques and strategies would visit their partner farms to

assess how they had been operating. They would also share knowledge with these farms about new techniques and strategies that were being used in farms operated by africaJUICE. As argued before, handling the emergence of new diseases and pests by sharing knowledge led to a reduction in the wastage of fresh produce.

The importance of using the right kind of fertilizer during the different stages of a plant's life was also specified by AJ 2. Due to the knowledge possessed by the experts at africaJUICE, they used new fertilizers and completed the entire course of the fertilizer. This means that they used it for the recommended duration.



Illustration 5 - Shows the post-harvesting technique used in the field

The physical harvesting of passion fruit was observed during the visit to africaJUICE-plant. The fruits were planted close to each other to make it easier and productive for the workers picking the fruits. After the fruits had been harvested, they were collected under a tree or in a structure to prevent them from direct sunlight. When enough fruits had been gathered, a tractor collected the fruits in order to deliver them at the factory. AJ 2 also mentioned that appropriate harvesting techniques were used to reduce losses. The techniques included cutting off the stem instead of removing it forcefully. They also had special varieties of trees to make the harvesting process more efficient. For example, we observed dwarf papaya trees



that made it easier for the workers to harvest papaya as they did not have to use a stick to cut off the stem.



Illustration 6 - Dwarf papaya (left) Normal papaya (right)

When compared to passionfruit, mango has a different harvesting season. This enables africaJUICE to have a continuous flow of income throughout the year as they do not depend on just one fruit for their income. The following process regarding the sorting of mangoes was explained by AJ 3; The mangoes enter the factory gate and are placed in a shed on the ground. Then, the workers sort the mangoes which led to some wastage due to handling. As the workers sort the fruits, they have to wait in the shed which reduces their quality and can result in losses due to the time spent under the shed. The fruits are then moved into the machine in order to be processed as juice.

When it comes to the factory, “it can produce juice at a rate of up to 5 tonnes/hour. Out of all the mangoes that ultimately reach the factory, approximately 8 % of them are rejected due to various deviations from the standards” (AJ 3, 2020).

In summary, being a participant of both the local and global chain, africaJUICE mostly reduces mango waste by sharing knowledge and experience. The other features where a big global actor sets high standards of quality and product value, were not present. Nevertheless, we observed clear evidence of how an actor that is

a participant of the local as well as the global chain affects the local area in a positive manner.

#### 5.4 Intermediaries

Intermediaries, in this section, include all the actors that connect the producer i.e. the farmer, to the end consumer, thus including the wholesalers, brokers and traders. The findings are aligned with the literature in terms of how the chains are organized as systems with several actors involved. As a result, there is a lot of handling connected to the intermediaries, which implicitly leads to losses along the chain.

AJ 1 pointed out that a lot of wastage occurs on the road. The key reason is due to the trucks and vehicles used by the traders. The trucks did not have a cover on top to protect the fruits from adverse weather conditions. Furthermore, AJ 1 claimed that the local traders did not use boxes to store fruits during transportation. Instead, the products being transported were stacked on top of each other in the vehicles which led to wastage due to bruising and crushing. According to AJ 1, the traders who work with africaJUICE cause almost 6-7% of total mango losses, however, he was not sure of the exact number. AJ 1 explained that the problems concerning transportation and traders occur to some extent in Europe as well, but to a lesser degree.



Illustration 7 - shows how “wild” the environment is.

The products were also crushed due to the presence of bumps and potholes on the roads. Furthermore, the transportation time from the farmers to the market is increased because of the roads, which leads to wastage along the journey. The roads during our journey from Addis Ababa to Awash were not very well maintained. AJ 1 explained that it gets even worse after it rains and this was the only way they could transport their products to Addis Ababa. However, the government was working on a new project to develop and upgrade the roads in that area.

The discussion with experts from Jimma University concerning intermediaries led to interesting observations regarding their role within the investigated supply chain. JU 1 mentioned how intermediaries fixed the prices because they had tremendous market power compared to other actors within the chain. Information asymmetries between the intermediaries and the farmers were also prevalent. The prices were increased by almost 4-5 times by the intermediaries, which means that the broker bought mangoes at 5 birr/kg from the farmers and sold them for 25 birr/kg in the market.

Farmers are not the only ones affected by information asymmetry as the intermediaries can easily shift their burden on the consumers, making them pay for the losses. For example, a glass of fresh mango juice in the market can be 18 birr one day and 22 birr the next day just because there was not enough supply. JU 1 further explained that the government has tried to intervene in the practices followed by intermediaries but has not been able to find an effective solution to the issues mentioned above. However, the intermediaries play an important role in connecting the local markets - served by smallholders - to the bigger markets in major cities. For example, the smallholders sell their products in the local market in Adama, where the brokers buy a proportion of the products being sold. The brokers then transport these products from Adama to the main market in Addis Ababa.

JU 2 explained how intermediaries can also have an effect on the quality of mangoes being produced. The farmers are not motivated to produce better quality mangoes because they receive the same price from the brokers, irrespective of quality. Thus, no quality standards are set by the intermediaries, which does not

give the farmer an incentive to produce better quality mangoes. Both the experts agreed that the brokers can take initiatives to improve the chain, however, they are reluctant because it is easier for them to transfer their losses on to consumers. The economic meaning of this situation will be further discussed in the next section.

Moreover, the experts at Jimma University confirmed that there was a lack of cold chains. However, established and global companies had started buying cold storage trucks but it was still not a common practice to use cold storage infrastructure in Ethiopia. For example, it was observed that a high-end hotel chain had invested in cold chains.

The students at Jimma University further explained that sometimes the intermediaries are not available for the smallholders. As a result, the smallholders have to transport their goods for a long distance before actually meeting a broker. Also, the participants agreed that intermediaries do not care about the losses because it is easier for them to shift the price burden onto the consumers as they can easily increase the prices when supply is lower. Thus, the participants associated intermediaries with an increase in price.

### **5.5 Retailer/Market**

As described earlier, the retailer/markets are the actors closest to the end consumer. Although, it was observed that the local markets are a prerequisite market for the brokers to purchase products, in order to sell them for a profit later. However, it is dependent on the system under observation. Note that the characteristics of a supermarket are rather rare, with the markets and the retailers operating as smaller shops and roadside stalls.

Atkilt Tera is a fruit and vegetable market around the Piazza area in Addis Ababa and is the largest fruit and vegetable market in Ethiopia. Our visit to the market revolved around observing how the retailers sell their products and the amount of wastage in the market. Most of the fruits and vegetables in the market were already very ripe, which means that they were more likely to be wasted as a result of decay. A lot of fruits and vegetables were under direct sunlight on the ground and on a piece of cloth which had stones and dust, making it easier for the products to get scratched. The products were continuously being transported from one place to the



next using wooden baskets, leading to wastage. Also, there were a lot of cars and trucks going through the market which caused accidents and damaged the products. For example, we observed a car crushing a bag of fresh vegetables as shown in illustration 10, which ultimately had to be thrown away. Most of the trucks that were being unloaded had fruits and vegetables stacked on top of each other which increased the wastage due to bruising, squeezing and scratching of products. However, it was interesting to observe how several independent brokers collaborated with the logistics and sales of each other's products. The overall business practices followed between the actors present in the market were friendly and collaborative.



Illustration 8 - example of fruit transportation from the Atkilt Tera market



Illustration 9 - shows how the ground at the market was and the severe losses of food, hence inadequate storing





Illustration 10 - Shows how cars can damage fresh fruits and vegetables

A general observation around retailers concerned the roadside stalls of fruits and vegetables sold by smallholders. Since this was a general observation, it will be referred to as “GO” in the text when it is cited. During the visit to Jimma and Atkilt Tera Market, a lot of roadside stalls were observed. It was interesting to see that all of the stalls in a particular area sold the same product, for example, bananas. As a result, the prices of bananas in that area would be low due to excessive supply.



Illustration 11 - Roadside stalls selling similar products

## 5.6 End Customer

An important distinction one has to be aware of is the location of the end consumer, which is dependent on the local and global market. Note that the local market can include both the rural and national market.

Concerning the end customers in Ethiopia, JU 1 mentioned that the local consumers prefer the fruits to be ripe right out of the market because of local preferences. JU 2 gave an example, where consumers in Ethiopia preferred bananas with brown spots instead of the yellow bananas. This showed that they wanted products that are already ripe and ready to be consumed. This was very different from what is done in Europe. As a result, the brokers also tend to ripen the mango before transporting them to the market in order to sell the products easily and quickly. JU 1 further claimed that this led to around 20-30% wastage because some of the products become overripe when they reach the market. This was the current practice being followed by the traders and retailers in Ethiopia. When it comes to the losses in the market, both the experts claimed that around 50% of the loss in the market can be accounted towards inadequate information among consumers and traders.



Illustration 12 - Good (a) and poor quality (b) mango fruits (Esguerra & Rolle, 2018, p. 12).

JU 2 gave an example of how the combination of not harvesting mangoes at the right maturity stage and poor harvesting practices usually led to lower sugar content level. A high sugar content level is a prerequisite condition for some value adding activities and for mangoes exported to Europe or other developed countries. Thus, the mangoes with lower sugar content cannot be exported to

Europe or other developed countries with strict quality measures. JU 1 pointed out that the upper level had this knowledge regarding the importance of sugar content, but the information was not shared adequately with the smallholders, resulting in poor quality mangoes. Furthermore, as seen in illustration 12, “after harvest, mangoes are arbitrarily classified as “Class A” (good quality; for export or for institutional buyers like supermarkets and hotels) or “Class B” (local grade or for domestic market” (Esguerra & Rolle, 2018, p. 11)

Concerning the value added aspects of certifications in the Ethiopian market, AJ 1 explained that they had previously offered products to their customers while practising fair trade with certifications from the Fairtrade organisation. However, they noticed that their local customers did not value these certifications and thus, did not pay extra to get these certifications on their products. The problem with certifications is that compliance with the standards involves high approval cost and high monitoring costs. Also, they had to pay to be able to use the Fairtrade certification mark on their products. Since the customers did not care if they had the certification or not, it was just an additional expense for africaJUICE, without any benefit. As a result, they continued to practice fair trade but decided to no longer obtain the certification as it was of no use and importance to the local customers. It was the same with organic farming as they grew everything organically but did not obtain the certification because of the reasons mentioned above.

Another interesting observation was that the students at Jimma University were not aware of the “Fairtrade” certification. This supports the comment made by AJ 1 regarding the unpopularity of Fairtrade certified products in the local market. Thus, there is no incentive for any of the actors within the supply chain to invest in the fair trade certification when selling to the local market.

## **5.7 Cooperatives**

In terms of cooperatives, we observed different levels of specialisation. The first one was a general farmer cooperative - where simple cost sharing and collaboration were key. The second cooperative was strict and regulative - where they acted as a third party to facilitate and govern the market. Lastly, an open cooperative was observed which focussed on knowledge sharing, trading and possibilities to access markets.

The experts at Jimma University explained how cooperatives, particularly the farmers cooperatives, are managed in Ethiopia. JU 1 pointed out that the farmers organize themselves into cooperatives in order to share the cost of agricultural equipment and infrastructure. However, in some instances, smallholders do not benefit from the cooperatives to a greater extent due to infrastructural constraints of the cooperative. They have warehouses and packing spaces, but are not well equipped when it comes to distribution as they use outdated trucks and cars. Countering this argument, JU 2 explained that the farmers do not possess any mode of transportation so it is better for them to be associated with the cooperative. Another interesting point mentioned by JU 2 was that if the farmers work individually, they become price takers. However, the cooperatives are allowed to sell directly to the central market which eliminates the middlemen and ensures that the farmers are given a fair price for their products. Thus, both the experts were in favour of utilizing cooperatives to assist smallholders.

Both the experts at Jimma University also pointed us in the direction of specifically looking into the coffee industry and analysing how the reasoning around cooperatives had been used to solve the issue of wastage and exploitation in this sector. JU 2 pointed out that the fruit industry currently has several issues in terms of efficient supply chain management. The same issues had been observed in the coffee value chain, but the performance of their chain has been improved through cooperatives.



Illustration 13 - Shows the facilities at ECX, Jimma

During the interview with an individual at ECX, she took us through the general process and how they operated as a third party to secure equal treatment for all the actors in terms of quality, certifications and general distribution. ECX 1 mentioned that ECX was established 11 years ago with a focus on improving the coffee supply chain. She further explained that it is not a charity or non-profit organization as they charge a fee from the buyers and sellers. The fees are related to storage, handling, grading and marketing. ECX 1 also mentioned that it was not necessary for the cooperatives/smallholder to use the services provided by ECX. According to ECX 1, most of the cooperatives/producers use the grading facility provided by ECX instead of using their warehouses. The interviewee was then asked the purpose behind creating an organization like the ECX. She explained that before ECX was established, the coffee industry in Ethiopia was not organized. As a result, there were no standardisations and quality requirements which led to exploitation and inefficiencies in the chain. The ECX was created to overcome these issues and find a suitable solution. The importance of a cooperation like the ECX is further explained in the discussion section.

We met with a representative of the Africa Agribusiness Academy (AAA), which is a cooperative for agricultural producers that strive to share knowledge, experience and information between the actors involved. The representative will be called AAA 1. They currently operate in 6 countries within Africa which enables

them to create a marketing network between these countries. For example, their members in Ethiopia can trade products with members in Kenya which facilitates the development of relationships between the actors. They also agree with the proposition that cooperatives can improve market access for smallholders and their ability to perform effectively.

Thus, AAA tries to share knowledge and educate smallholders in order to improve on this issue. They explained that their organisation also acts as a bridge and facilitator for the participants, which increases the chain's performance. They had the ability to connect certain producers with markets internally within their country, in addition to foreign countries in Africa due to their international connections. Thus, they focus on developing efficient channels and improving the current supply chains; not strictly for mangoes but for all perishables. They also had a board of consultants which specialised in different areas of agriculture. The members can easily interact with these consultants to find solutions and make their operations more effective.

## **5.8 Other Relevant Findings**

This section discusses the relevant findings made during the research trip and the subsequent explanation given by some of the practitioners. These findings are relevant, but not explicitly related to the categories mentioned above. In addition to the information obtained from the interviewees, some of the general observations and secondary data from the practitioners has also been included.

The interview with AJ 2 included discussions concerning planting techniques, how the plant should be treated and why pre harvesting is important for minimizing post-harvest losses. AJ 2 mentioned that the most important thing to ensure a healthy plant is to build a "strong foundation". She further explained that using appropriate pre-harvesting techniques is very important to minimize losses when it comes to post-harvest. If the plant is not healthy enough before harvesting, it will not produce a healthy fruit which will then lead to an increase in losses.

AJ 2 said that pruning trees was important, as it made the harvesting process much more efficient along with making it easy for the workers to apply fertilizers and pesticides. With the help of pruning, the fruits could be harvested much faster



leading to an increase in profits due to less time being spent by the workers on harvesting the fruits. This also reduces the wastage of fruits by making the whole harvesting process easier. The extent to which this was implemented by the smallholders was dependent on their knowledge and the type of mango tree being harvested.



Illustration 14 - Workers harvesting papayas (stored in the shadow underneath dried leaves)

During a visit to a farm, some workers were observed while harvesting papaya. Since this was a general observation, it will be referred to as “GO” in the text when it is cited. It was interesting to see that they were using a stick to cut off the stem and then catching the papaya instead of letting it fall to the ground. This practice avoided any bumps and did not deteriorate the papaya’s quality. Since it was not the harvesting season for mango, we could not see them collecting mangoes. Furthermore, during this observation, it could be seen that there is room for improvement considering the safety standards. An example; during the harvesting of papaya, when the stem breaks an acidic liquid is released which can damage the skin or eyes by direct contact. The observed workers had just received gloves and protective clothes but did not have protection for their eyes.



Illustration 15 - Shows the physical damages the acid liquid can cause on humans and on crates

As a result of being associated with the SUSTAIN project, we got access to previous research done by fellow students at Jimma University. His previous thesis was investigating the post-harvest losses of tomatoes in Ethiopia and stated the following;

*“Cooling produces to remove field heat is scientifically recommended by many researchers. Nevertheless, almost no practice of cooling tomatoes is done at any stage of the chain in the studied districts. There is no management of temperature. It was observed that tomatoes were put in box right in the field without any protection from scorching sun while waiting for trucks to come and pick them up.”*  
(Woldegiorgis, 2013, p. 65)





Illustration 16 - Tomatoes covered with available materials for protection from sun-exposure  
(Woldegiorgis, 2013, p. 65)

Furthermore, AJ 1 was asked about africaJUICE’s competitors and the fruit processing industry in Ethiopia. He pointed out that most of the juice is imported in Ethiopia but local production has been increasing. Foreign currency shortages in Ethiopia have helped the local production as the traders do not want to spend foreign currency for such imports. Since africaJUICE is the only major juice supplier in the country, they faced no local competition in the fruit processing industry. According to AJ 1, the lack of capital is the biggest challenge in the fruit processing industry. When africaJUICE started operations in Ethiopia, they had to import most of the fruit processing machines which cost them a lot of money and considerable capital investment. For example, the aseptic system used by africaJUICE for packing the juice extract has to be imported from Italy as it is not available in Ethiopia. These amounts of capital are not available with smallholders or even medium sized farmers, which makes it difficult for the industry to grow.

Furthermore, AJ 1 was asked if global warming and climate change had impacted them over the years. AJ 1 pointed out that the climate is changing rapidly as compared to 10 years ago; forcing them to change and keep up, due to the emergence of new pests, diseases and other considerations such as volatile seasons.

The smallholders in the area have struggled in dealing with certain new pests since they lack knowledge to avoid these new pests. africaJUICE, on the other hand, has the resources and knowledge to manage the pests. However, AJ 1 mentioned that if they find a solution only for themselves, the smallholders around their area will still have the problem. This is risky for africaJUICE's crops since the pests can easily spread between farms. Thus, they share knowledge with all the actors in the area, which benefits the smallholders as well as africaJUICE.



Illustration 17 - A central part of the curriculum at Jimma University within the course on post-harvest management.

The experts at Jimma University explained how post-harvest management has been neglected by the actors within the chain. On one hand, concrete strategies are not being used by the supply chain actors to reduce the wastage occurring due to post harvest mismanagement. On the other hand, the government has not implemented new policies towards improving post-harvest management. For example, the farmers are taught new techniques regarding pre-harvesting practices but nothing concerning post-harvest management. According to JU 1, it was important to have a post-harvest management strategy for all perishable products like fruits and vegetables. He further mentioned that Jimma University was working in collaboration with the Ministry of Agriculture to develop such a strategy for the future.

At the end, the interviewees (experts at JU) were asked if the research being conducted can be expanded for other products. Both the experts agreed that the research can be expanded because mango is a climacteric fruit which means that the results can be tested for other perishable products to some extent.

The interview conducted with JU 3 was short and had some key observations concerning the education sector. According to JU 3, over the years, more attention has been placed on the need to utilise knowledge in all the stages of the harvesting process i.e. pre-harvest, harvest and post-harvest. Therefore, improved education and specialisations have been developed in this direction and is supposed to serve as a catalyst for knowledge development. Furthermore, in recent years, the government has offered favourable loans to students, thus participating in this development.

At the end of the session, the participants were asked a question; who was responsible for fixing all the problems discussed? They responded that the government was responsible for improving the condition of smallholders and reducing wastage. Then, a discussion took place concerning the hypothesis mentioned earlier regarding the effect of cooperatives and global chains on smallholders. At the end of the discussion, most of the participants agreed with the hypothesis, concluding that the cooperative and global chain solution can support the efforts made by the government.

JU 1 and JU 2 also discussed the importance of geographical location for the actors. They explained that one can divide the country with the Awash river in the middle (from north to south), and the left side will be the fresh produce production areas (see illustration 1). These areas are better-suited in terms of climate, which, of course, is a big competitive advantage, but still there are differences. Asosa, which is the most famous area for mango production in Ethiopia has the right climate and can deliver high-quality fruits - but the area is located far from the main market in Addis, which means higher transportation costs.

## **5.9 Summary**

The findings have been used to create an illustration which highlights the main factors that lead to wastage within the FPSC of mangoes in Ethiopia. Furthermore, the different stages and their coherent factors that affect performance from the perspective of wastage have been identified, and depicted in illustration 18.

**Identified factors influencing the post-harvest losses in the FPSC of mangoes**

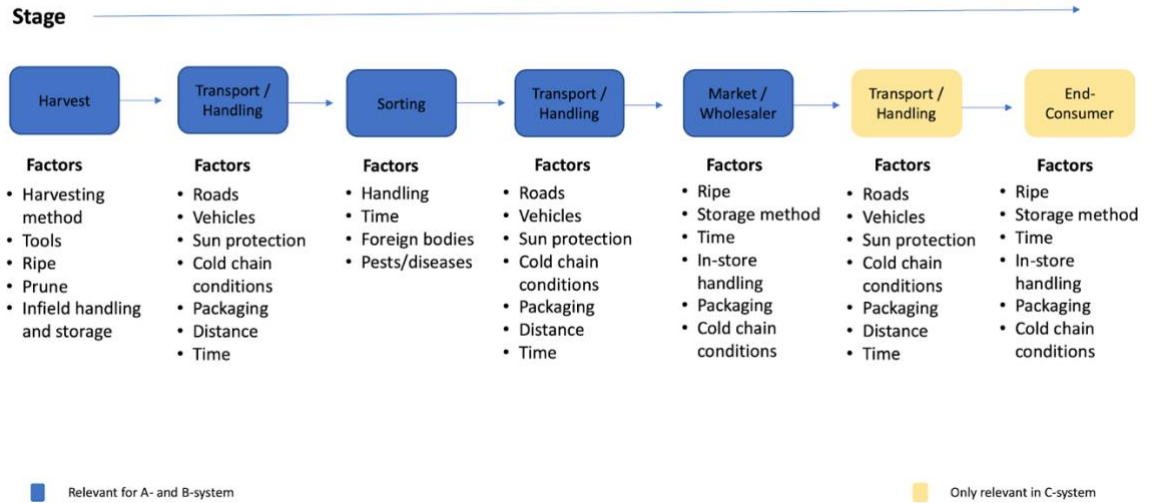


Illustration 18 - Identified factors influencing the post-harvest losses in the FPSC of mangoes

Even though the focus of this research does not cover pre harvest activities, it is important to understand the effect pre harvesting activities can have on the later stages. The illustration above starts from harvest - where techniques and tools are important. Moving on, handling is a major issue - which consistently leads to wastage. Transporting/handling is also a factor that occurs repeatedly throughout the chain, which makes it an important factor to investigate and improve. The two factors depicted at the end are only relevant in the C-system. Note that in the A- and to some extent B-system, the number of actors involved tend to be higher than the C-system. Although the chain in the C-system looks longer, the handling is decreased due to the reduced number of actors involved along the chain.

In summary, the factors identified from the findings are similar to the issues found in the literature. Overall, the findings and the literature discuss how excessive handling, inadequate infrastructure and exploitation of actors are significant factors for the wastage. However, the findings also illustrate that the factors identified above are present due to the surrounding circumstances of the smallholders and lack of successful government intervention. In the following section, these factors will be discussed in detail using the chosen framework.

## **6.0 Discussion of Theoretical Framework**

### **6.1 Introduction**

The theoretical framework presented earlier can be used for supply chain analysis in a developing country and is made up of three components; Value chain constraints, value chain analysis and value chain upgrading. In the following section, the theory and observations will be discussed according to the chosen framework. Furthermore, constraining factors will be identified followed by an analysis before suggesting suitable upgrading options. Lastly, an overall conclusion has been presented which incorporates four transformative solutions.

### **6.2 Value Chain Constraints**

This section will discuss the constraints which are restraining the whole chain and its configurations to develop further. The Trienekens (2011) framework presented earlier has been used to look at the following three constraints; market access & market orientation, resources & infrastructure and institutional voids. They will be discussed based on the findings from data collection.

#### **6.2.1 Market Access and Market Orientation**

As argued earlier, the purpose of a supply chain is to produce and deliver products or services with a value for the customer in a market. With this in mind, Trienekens (2011) argued that there are three distinct subsystems with specific quality and safety requirements with different market channels. The data collection enabled us to observe two of these subsystems, see illustration 2 and 3.

In general, our perception of the fresh produce supply chains in Ethiopia is categorized as the A-system. That is, a chain where the producers' end has several smallholders producing small volumes of fresh produce into the chain. In the area of Awash, africaJUICE gave us insight on how the local smaller farms operated. They confirmed that smallholders delivered mangoes and fruits to the local market in Adama (which is 2 hours away from Addis). However, in Adama two possibilities arise. Either the mangoes are sold locally for consumption or transported further into Addis by the intermediaries to serve that market.

africaJUICE in itself is a combination of both the B-system - serving the middle-high income market but does also possess some aspects of the C-system. Before going into the observations, we want to substantiate two things in relation to the A-system. Firstly, as illustrated in figure 5, one can see how actors from the A-system may offer supplies into the B-system. This is a reality! In the literature, this was argued to be present in order to balance supply and demand - which based on our findings, can be confirmed. However, we also observed through africaJUICE that the A-system can offer supplies to the C-system. This is not so much dependent on balancing supply and demand - rather dependent on the volatile market conditions of prices in addition to africaJUICE's own production, thus the quality of their fruit at that time. This will be further explained below.

In terms of the B-system, they often serve the middle-high income chains and the literature points at how they are serving the emerging industry of supermarkets. However, our observations from Ethiopia suggest that they would not supply to supermarkets, but rather high-end local markets - as that is how the various markets differentiate. The presence of supermarkets is much lower than what you might imagine in e.g. developing countries in Asia such as Thailand and Vietnam.

Moreover, africaJUICE, like others in the B-system, supplies to the middle-high income market. How much and what to supply are dependent on the prices, which again is very volatile. africaJUICE uses their mangoes for local sales as a fruit, and also offers a value-added product by creating juice for the local and foreign markets. This is dependent on the quality of their fruits. In other words, they possess the ability to supply their own juice production with mangoes. However, since they have the capability to grow and produce high-quality mangoes, they are able to charge a premium price from the market - which again provides them with a higher profit compared to the following; Their juice production is not that dependent on high-quality mangoes or fruits, as the process of creating juice eliminates the differences. Thus, africaJUICE can use their own low-quality mangoes for juice production and supplement it by buying the remaining amount from local smallholders with lower quality at a lower price.

The reason for arguing that africaJUICE is characterized as both the B-system and the C-system is because they also supply the export market. However, aligned with

most theory; they only export juice as a product, which has a value-added to the original product and with high quality.

In general, all the actors we interacted with had access to a market, however, to what extent was dependent on several factors. africaJUICE is a big company with bargaining power and sufficient infrastructure which enables them to be market-oriented easily and efficiently. On the other hand, other actors, such as the small producers in Upper Awash had limited market access, as their infrastructure was inadequate and they lacked the means to change their situation. To our best knowledge, this constrains them from being market-oriented and act on the market information. As stated earlier, we find collaboration to be an important aspect within this section and have discussed its relevance below.

#### **6.2.1.1 Collaboration**

Overall, the research identified two distinct chains in Ethiopia (illustration 2 & 3), the first through africaJUICE which is a bigger and more developed company, and the second through smallholders selling their fruit to brokers which later ended up at the local market in Addis. The degree of collaboration in these two different chains was very divergent.

In the perspective of africaJUICE, most of the collaboration was identified internally in the organisation. They could use shared infrastructure like trucks to both distribute their juice and just the fruit as well as a combination of different fruits. An interesting discovery was how they occasionally collaborated with other smallholders in the area to handle and tackle issues concerning pesticides and fertilizers. A concrete example will be given in the next section.

The discussions from our research trip gave insight into how the smallholders at Awash operated, however, it seemed that limited collaboration took place between the smallholders. On the other hand, when we visited the local market in Addis we could see how the practitioners assisted each other in getting the market set up. It was organized in terms of how they were all going to locate their products and “stores” - but no coordination of the products to be sold. In other words, they were all selling the same items - meaning that they suppressed each other’s prices leading

to low profit. We did not get any proper comments or further information from individuals at the market, due to the language barriers.

To conclude, our findings seem to be aligned with the reasoning from theory where a constraint for producers to be part of a successful supply chain is determined based on their access to market information and if they possess the ability to translate and act on this information. It was observed that the actors had the ability to translate this information, but obtaining the information is the constraining factor. As most of the mango producers in Ethiopia, both in number and volume are smallholders, we can conclude that market information is the biggest issue in this category. Other factors such as interrelationships and governance mechanisms are relevant but will be applied at a later stage within this framework. The next section discusses the utilization of resources and infrastructure.

### **6.2.2 Resources and Infrastructure**

According to the literature, low-income countries like Ethiopia face a problem with inefficient utilisation of resources and infrastructure, which was observed during the visit. According to our findings, all of these factors are considered to be important determinants of wastage within the agricultural supply chain. However, some additional information and explanations were discovered, which were not mentioned in the literature. In this section, the four constraints have been systematically discussed and the arguments have been demonstrated based on our observations and findings from Ethiopia. In addition, the discussion is also focussed around the issues concerning infrastructure.

Trienekens (2011) pinpoints four distinct categories within resources and infrastructures which can constrain the supply chain in developing further. Firstly, physical resources may hinder the supply chain in developing, where input supplies are an important factor. Based on our observations, there are several factors to debate. In terms of fruit and mango production, the most important factor other than climate is access to water. The location of africaJUICE`s farm, for instance, was next to the Awash River. They also pointed out that they had invested in the infrastructure of the canal, which had to be dug so that the river would reach their location. On the other hand, you have those smallholders which do not have the same means as a big actor, thus limiting them to trust the climate or buy water from



a different supplier which can be very expensive. Water prices do of course vary along with demand and when one farmer needs water, others need it as well. Another relevant example is the farmers access to fertilizers and pesticides. This is closely connected to another category as well, and will be discussed further there.

Secondly, the geographical position of a company or a supply chain may hinder its ability to develop. The practitioners, actors and experts we interviewed had a common perspective on how one can perceive Ethiopia in terms of fresh produce production and its coherent markets. As mentioned in the findings, certain areas are better suited in terms of climate, which is a big competitive advantage. However, these areas can be located far from the main market which is another disadvantage when analysing the geographical position of an actor within the supply chain. Thus, several factors which can influence one's competitive advantages were observed in terms of location. This also affects the amount of post-harvest losses.

Thirdly, access to educated labour with sufficient knowledge is another hindrance to development. As mentioned in the findings, farms operated by smallholders were often family-owned and passed on from father to son (AAA 1, 2020). This was a typical trend in the rural areas and the knowledge the farmers possessed was dependent on what his father had taught him. In the location of Awash and Upper Awash, the smallholders had, for instance, struggled in coping with one of the newer diseases, and could not fight this as their old traditional solutions did not work. However, africaJUICE's facilities are located in the same area and they have access to experts which have a broader knowledge. Note, that this example did happen shortly before we arrived, but africaJUICE shared the solution with the farmers in the area, thus the area was able to cope with the issue.

Fourthly, the availability of technology is mentioned as a source which can constrain the development of any supply chain. In terms of our observations, different results were identified based on the distinct channel under consideration. For instance, the smallholders used old, traditional tools and gadgets, which cannot be categorised as the most efficient technology or alternative. On the other hand, the experts we spoke to mentioned how the most exclusive hotel in Addis, had its own distribution channels where the process behind cold chains was implemented; when stored and transported (JU 1 & 2, 2020).

At africaJUICE they used technology in multiple ways, such as water pumps for their irrigation systems, processing of juice and were even exploring how one can implement drones to handle pesticides. However, note that the technology might not be easily available in the country and that the actors often need to look globally to find suitable technology. This also requires them to interact with and explore new knowledge continuously - which might be challenging for smallholders with limited resources.

As mentioned above, the following paragraphs will go in-depth on the presence of specific communication and distribution infrastructure as it is another vital aspect to be considered in relation to supply chain upgrading and development.

As identified earlier, there is an absence of feeder roads connecting the farmers to the marketplace in Ethiopia. Even if there are roads, they are usually of poor quality or not passable in bad weather (Hanjra et al., 2009). However, there are some high-quality roads leading to major cities, but when rural areas are considered - where most of the agricultural production occurs - they are not well connected to such roads. This raises the issue of how roads and transportation can affect the wastage of mangoes.

The issues concerning roads mainly depend on the quality of the road. As established earlier, low quality roads may affect the wastage of mangoes in two ways. On one hand, the bad quality might lead to bumps, dust and other disturbances which affects the quality of the fruit. Secondly, low quality roads affect the time used for transportation. As the weather conditions are “against” the fruit - which are often transported in open containers - reduction of exposure time is important. The argument concerning the development of roads in Ethiopia is connected to the location of good quality roads. Most of the fruit production occurs in rural areas, which are not located close to the main roads. Thus, being located close to a high quality road might act as a competitive advantage in the same manner as how africaJUICE has located their facilities next to a canal. High quality roads are a recent development and the government is continuously trying to improve the situation (Tegebu & Seid, 2017).

As established earlier, the quality of the mode of transportation being used can contribute to further wastage or compensate for the bad road conditions. The smallholders have knowledge concerning the importance of protecting the fruit from direct exposure to sunlight, however, they do not have the most efficient means of transportation and have to utilise the resources they possess. This can be seen in illustration 16 where the smallholders try to keep the tomatoes cold during transportation but they have to use wooden boxes and leaves (Woldegiorgis, 2013). The argument here is that if the smallholders have the suitable infrastructure, they can utilize it efficiently as they possess the knowledge required. In other words, there is a lack of infrastructural resources rather than the smallholder's ability to utilize these resources.

The literature emphasizes on the importance of using technology to minimize agricultural waste in Ethiopia. Using technology to exchange information was one such example given in the literature (Cao & Zhang, 2011), which was supported by africaJUICE as they explained that farmers do not have access to the internet (AJ 1, 2020). This made it difficult for them to collect information regarding the market they will be supplying. Thus, they have no clue about the prevailing prices in the local or global market. As a result, the intermediaries can exploit them by paying a very low amount for their products, which then gets wasted as the intermediaries face minimal loss due to the low cost price. This was aligned with our findings as the agricultural cooperatives were not well equipped with infrastructure, especially technological infrastructure (JU 1, 2020).

There were three main reasons behind the lack of investment by small farmers towards improving their infrastructure; 1) Lack of capital, 2) Monopoly and 3) Incentive (AJ 1, 2020). First of all, the biggest reason is the lack of capital or cash with the small farmers. They do not have a lot of cash in hand throughout the year which makes it difficult for them to invest. The second reason was a problem of monopoly as one trader was responsible for collecting products from a particular area of smallholders. As a result, the intermediaries dictate the market price and can pay the price that is suitable for them. This leads to uncertainty in the price offered by intermediaries to the farmers. The third reason was that the farmers received the same amount irrespective of the quality of their products. Therefore, the farmers have no incentive to invest in new technology as they are uncertain if their

investment will give any return or lead to an increase in their revenue. This finding was very insightful and thought-provoking, but missing from the literature we read.

A lot of similarities between the literature and our findings from the trip were noticed, when it comes to infrastructure. The observations were in line with the theory on roads, transportation and technology. Furthermore, we learned that the government and large companies are focusing towards improving the road and cold storage infrastructure in the country (AJ 1, 2020; Tegebu & Seid, 2017). However, there were some new observations which were not mentioned in the literature and were interesting to discover. The reasoning behind low investment by smallholders was a new discovery which has helped in understanding the current state of technology and infrastructure in Ethiopia. Furthermore, the new findings have helped in explaining why infrastructure is a significant cause for wastage within the FPSC (AJ 1, 2020; JU 1 & 2, 2020).

In summary, we experienced how resources and infrastructure both constrained certain supply chains, but also enhanced others development and performance. It has been discussed that four distinct categories can constrain the supply chain in developing further. The physical resources are debated in relation to water, transportation and roads. The geographical position of the actor in a chain is also examined, which is a significant contributor towards competitive advantage. In terms of labour, there is a tendency towards more educated labour, but it is still limited. Lastly, the availability of technology is debated - and there is a clear trend which indicates that bigger and global actors are the ones that can utilize and present such solutions into the local markets. Again, the actors do possess the required skills and understanding in terms of resources and infrastructure - the constraining factor is mostly embedded in the lack of infrastructural resources. Moreover, other than the availability of resources it is clear that the presence of coherent distribution and communication infrastructure is essential for upgrading and further development of a chain.

### **6.2.3 Institutional Voids**

In the section concerned with constraints for a supply chain to upgrade and develop, Trienekens (2011) made it clear that the institutions have an impact on organizational life. In terms of the three definitions of institutions; regulative,

normative and cognitive, our findings give examples of how they all are present in Ethiopia (AJ 2, 2020; JU 2, 2020).

In the view of regulative institutions, the biggest difference present in Ethiopia was the lack of how the government facilitated business growth, etc. However, certain regulations were identified, which can benefit the business society, the economic development of a chain and perhaps the country itself. An example was how the government has in recent years altered their policies on facilitating pupils to study and get an education by offering favourable loans to students (JU 3, 2020). Note that the regulatory changes may enable students to study and specialize in post-harvest management. In the perspective directly linked to Mango and other perishables, we did not encounter any specific incidents or examples.

On the matter of normative institutions, two distinct topics can be discussed. The first one concerns the health and safety standards in Ethiopia. The observations point out that there is room for improvement in the usual norms practiced across the agricultural industry (GO, 2020). The second issue concerns transparency and exploitation between actors within the investigated supply chain. Lower transparency and lack of sufficient communication infrastructure enables the brokers to exploit the smallholders. However, the absence of these catalysts in developed countries disables the broker to act in the same manner.

The cognitive institutions precisely for the mango chain had perspectives similar to the global business environment, as the individuals we spoke to had greater knowledge and experience with foreigners and knew how to communicate in English. However, it is important to recognize that the differences in cognitive perception depends on exposure to global trade and the geographical location being investigated.

On the other hand, the presence of institutional voids was an interesting observation. The institutional arrangements were at certain aspects absent, as described earlier on the topic of how smallholders did not receive adequate support from the government (AJ 1 & 2, 2020). However, theory and our observations debate how cooperatives and the presence of the GVC might benefit these

constraining circumstances (Francesconi & Heerink, 2010; JU 1 & 2, 2020; Pietrobelli & Rabellotti, 2011), which is discussed below.

### **6.2.3.1 Cooperatives**

The following discussion is related to the solution that was implemented to reduce the effect of institutional voids within the coffee industry. The solution was put in place by the Ethiopian Commodity Exchange (ECX). They act as a third party and secure equal treatment for all the actors involved within the chain. By operating in such a manner, they managed to reduce the market power of the brokers (other than themselves) and perform as a link between the upper and lower stream of the chain. Similar initiatives can increase the performance of other chains, and with the reasoning from the experts and AAA (AAA 1, 2020; JU 1 & 2, 2020), would lead to fewer actors, thus less handling and better performing chains in terms of losses.

In other words, one can say that the perspectives in terms of cooperation were somewhat different between the two cooperatives, even though their aim was more or less aligned towards the same purpose. ECX acts as a strict regulator and operates as an enforcer towards cooperation, thus extracting the benefits through their process. Whereas, AAA acted more as an active facilitator aiming at regular participation from their members to enable efficient and good cooperation between the actors.

### **6.2.3.2 Global Value Chain**

There are several ways of how a big global chain might influence and affect the local supply chain in a positive manner, as argued earlier. One of the ways mentioned is how a global chain can request higher quality, better standards and higher value-added to the products - this was not observed in our case. africaJUICE and its business are not dependent to the same extent on quality etc. as they perform value-added activities which can handle lower quality fruit. Thus, the arguments revolve around how a global chain can affect its local community, share knowledge, experience and in general develop the community. An example was demonstrated in the findings where africaJUICE constructed a canal for irrigation which ultimately helped the entire local community (AJ 1, 2020). Another example

concerns the emergence of pests due to climate change and how africaJUICE assisted the local farming community to manage the pests (AJ 2, 2020).

In conclusion, the discussion shows how institutions can both hinder, but also provide possibilities to enhance the performance of a chain. Note, that institutions such as governments, cooperatives and other global actors have the means to affect its surroundings and the institutional environment of the developing countries' producers. As the government has not yet been successful in our case, we point to the other participants with means, to improve the institutional environment for all actors.

### **6.3 Value Chain Analysis**

Value chain analysis defines the three elements of a value chain; network configuration, value added and governance structures. Each of the three elements are discussed according to the observations made during our visit to Ethiopia. The purpose of this discussion is to analyse and understand the opportunities and obstacles within the supply chain under consideration.

#### **6.3.1 Network Structure**

As mentioned earlier, a network structure usually has two dimensions, horizontal and vertical (Christopher, 2016), which together makes up the network configuration. The actor's position within the configuration is mostly dependent on the market channels chosen by the actor, and choices regarding the channel are constrained by the limitations connected to market access and power relations (Trienekens, 2011).

Big corporations like africaJUICE have complete access to the market and are a key actor in their chain, empowering them with market power. On the other hand, the smallholders have limited access, and rarely obtain any power. Thus, it was usually the actor with sufficient market access and/or power who decided the distribution channels to be chosen. As a result, the most common distribution channel present in Ethiopia, in relation to the case, is distribution through intermediaries, which again pinpoints the characteristics of an A-system. This matter of market access can in some cases be determined by the level of utilization and/or limitations set by the

infrastructural settings. Absence of appropriate infrastructure, e.g. roads and trucks restrain the market access for certain actors (United Nation, 2019). This separates and hinders smallholders to sell their products in markets that are further away from their farm/production site. Thus, enforcing them to sell their products with the help of intermediaries and brokers.

africaJUICE`s position within their network configuration is composed in the same way as most businesses; a combination of vertical and horizontal relations. However, within this configuration, they have the ability to dictate the channel which makes it interesting and debatable. Firstly, their vertical structure can be identified in the actions where they produce juice extracts for their customers using products originating from their own farm (AJ 1, 2020). This is also the case when they buy additional commodities from other smallholders and then process it. However, it is also an example of how they horizontally interact with other actors. In other words, they have access to the market channel and possess the majority of market power, in addition to being the value adding actor.

In terms of the smallholders, their vertical structure can be identified when they interact downstream through intermediaries. In this case, the intermediaries possess the key to market access and therefore have the market power. There are some cases where the farmer might sell their produce directly to the customer, however these channels are smaller and occur occasionally. As mentioned in the findings, it was observed that there were stalls of people selling the same product (GO, 2020). Hence, it is important to note that selling the same produce, such as mango, within a delineated market, drives the prices and market power down due to increased competition. Smallholders which are not associated with a cooperative or a GVC, are rarely part of a larger vertical structure.

Actors with limited market access and weak market power are in a disadvantaged position within the configuration. To alter their position, there are ways of improving their situations even though they might have limited possibilities to utilize infrastructural resources. Moreover, their involvement within a cooperative or GVC facilitates entry in the distribution channel, thus leaving them with limited market power. However, some chains might be governed by transparency or other



factors such as extrinsic values which will be debated later. Note, that the implementation of for example; Fairtrade might raise a smallholder's "voice".

In conclusion, this section examines the network configuration, thus the vertical and horizontal relations present in the case. The presence of two distinct chains are debated; the bigger actor with market power and the smallholder with limited or no market power. Actors with limited market access and weak market power are in a disadvantaged position within the configuration, whereas the opposite is true for the more powerful actor. To alter their position, we advocate for how involvement with cooperatives or GVC can facilitate improvement in their situations. Note that relevant governance mechanisms are present, but debated later in the framework.

### **6.3.2 Value Added**

The amount of value added is determined by the customer's demand and willingness to pay for the additional value (Trienekens, 2011). However, there are a number of other factors such as technological capabilities, availability of resources and market characteristics that are responsible for deciding the value adding practices to be utilized. Ethiopia is developing and so are the general Ethiopian consumers, which are changing their original demand for products and their additional value. However, it is debatable to point out how the majority of the population is not yet a part of this development. Thus, their demand in relation to products with additional extrinsic value is still lower compared to more developed markets. On the other hand, products with additional intrinsic value are requested in their local market. Examples can be juice, alcohol, crafts, technological tools and equipment.

When the willingness to pay for an additional value for a product exists, the consumer will strive to purchase this item if it's within his/her opportunity, rather than the same without the additional value. This enables the producer to sell their product as the demand is present, and in some cases with an additional profit. In other words, there is an incentive for the producer to assign this additional value to their product or service (Pepall, Richards & Norman, 2014). This type of incentive is absent in the case of high-quality mangoes as farmers are not motivated to produce better quality fruits because they receive the same price - determined by the broker - irrespective of quality (AJ 1, 2020). This shows that no quality

standards are set by the brokers or intermediaries (JU 2, 2020). In other words, the farmers are indifferent toward value addition in mangoes because they will not be remunerated sufficiently for the efforts they put in. It can be argued that the brokers should take initiative to improve the chain. However, they don't, as they shift the burden from the losses and ineffectiveness onto the other parts of the chain. Thus, it is the producer and ultimately the consumer who pays for the loss and lack of incentives.

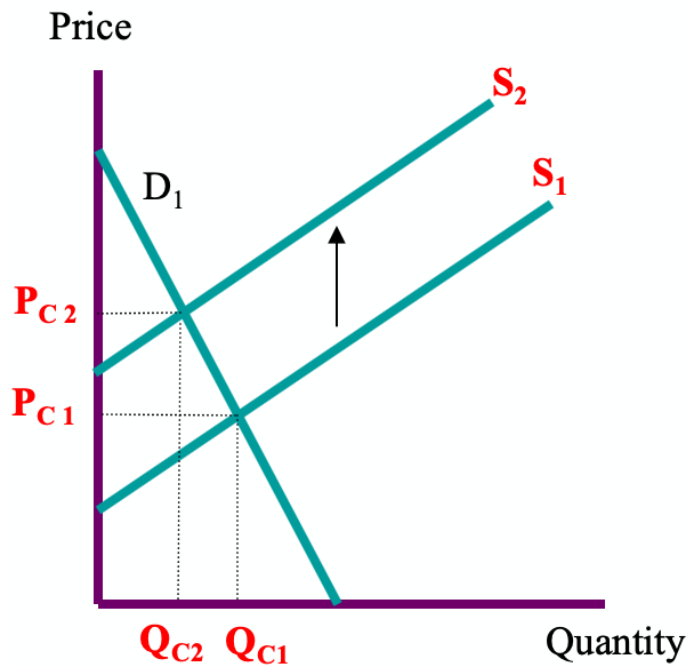


Figure 8 - Shows how a decrease in supply increases the price.

As shown in figure 8, when the quantity supplied is reduced from  $Q_{C1}$  to  $Q_{C2}$ , the price increases from  $P_{C1}$  to  $P_{C2}$ . As a result, the sellers can charge a higher price and increase their profits if the quantity supplied is reduced (Pepall, Richards & Norman, 2014). The same reasoning is used by the intermediaries to increase their profits. As the intermediaries hold immense bargaining power, they buy the products from smallholders at a very low price. Furthermore, it is possible for them to restrict supply in the market which inflates the price and ultimately leads to increased profits for the intermediaries.

It is important to consider if there are any economic incentives for the actors to reduce the wastage of mangoes. If the prerequisite condition was that all mangoes yield an economic return, there would be incentives for all the actors to reduce the wastage. However, this is not the case, which makes it more complex and challenging. In the current scenario, as more mangoes reach the market, the economic value is reduced. In other words, a higher supply to the market leads to a

reduction in the price of mangoes. Furthermore, the costs related to producing and transporting the products into the market will at one point exceed the economical income received from the product. The only way to handle the wastage is to make the industry understand how each mango has an economic value - that is the marginal value. To do so, the market is required to increase their demand, thus balancing this economic imbalance. To increase the demand, it is important to look into the opportunity of exporting products and looking beyond the local market. As mentioned before, there is a need to adapt higher quality and better standards in order to interact with global actors. Furthermore, association with cooperatives and/or GVC can lead to other opportunities which increase demand (AAA 1, 2020).

Another important aspect of value adding in terms of farming is the realization that value added to the product does not necessarily take place after, in this case, it is harvested. It is important to keep value addition in mind during all the stages of the chain. JU 1 & 2, (2020) point towards the timing of harvesting at the right maturity stage and how poor harvesting practices usually leads to lower sugar content levels in the fruit. A high sugar content level is a prerequisite condition for some value adding activities. As a result, these fruits cannot be exported to Europe or other developed countries with strict quality measures (JU 2, 2020). This aspect can be categorized as non-availability of resources, where knowledge is the resource. The smallholders do not have the knowledge and guidance to conduct their processes in accordance with European or other strict standards.

The literature advocates for how participation in cooperatives or relations to any GVC may present the possibility to access other market channels, knowledge and receive support towards meeting certain standards and requirements (Pietrobelli & Rabellotti, 2011). Thus, it can aid the actor in applying added value to their commodity or product. AAA's philosophy is aligned with this argument and strives to both, educate and empower the smallholders. Also, note that implementation of some value adding initiatives may induce the business with additional costs, thus collaborating with a bigger chain or cooperative reduces this risk.

Moreover, there is literature which states how the implementation of extrinsic values such as Fairtrade can benefit the supply chain's sales and performance (Trienekens, 2011). In the case of africaJUICE, this reasoning seemed logical when

considering their global customers, which again sell their finished goods in western countries. However, as  $\frac{2}{3}$  of their products were sold locally in Ethiopia, the added value was not requested. In other words, their customers were indifferent to the product being branded with the “Fairtrade” certification (AJ 1, 2020). There might be several reasons; such as the fact that the Fairtrade certification is unknown (Stud, 2020). Anyhow, a corporation which holds the Fairtrade brand, is induced with additional costs, reporting and transparency. Thus, in a market where this is not validated, it only hampers their economic performance. Hence, substantiating the reasoning for africaJUICE’s discontinuation of the Fairtrade certification.

Furthermore, there is a need to discuss the issue regarding the price charged downstream in e.g. the Western markets. The price charged does not directly translate into an equal division of the earnings between the actors of one particular chain (Trienekens, 2011). Hence the supplier, in this case the smallholders, are heavily dependent on the downstream parties in the chain to sell their produce. Thus, the downstream actors have greater market power and can yield a better profit from the sale. This happens as the smallholder is using the other actor’s distribution channel to access that particular market. It can be claimed that this occurs in most chains, but follows a healthier approach. Meaning, that all actors have the market information on prices, such that the usage of the service is fair. In our case, there is more exploitation from the intermediaries compared to normal supply chain management.

Again, there are several factors which affect one's ability to sell their produce and add value to it. Our findings indicate how complementary products such as the application of fertilizers, pesticides and other familiar equipment affects an actor’s ability to sell their produce (AJ 2, 2020). There was a huge problem with the availability of these products, which led to traders charging higher prices for the goods which were not used regularly. As a result, even if the farmers wanted to use the right equipment for their products, it was not possible because either they were not readily available or had to be purchased for a premium (AJ 1, 2020). This highlights the dependency of smallholders on other actors in the chain, in addition to the increased costs encountered.

The above problem of uneven distribution of value added throughout the chain can be solved with the help of collaborative agreements and forming trust-based relationships. As discussed earlier, participation with cooperatives and interaction with GVC`s can be examples of such a solution. The instance where africaJUICE shares knowledge with their suppliers is a relevant example (AJ 1, 2020). Another way to overcome this issue is through trust-based relationships. By being able to trust your partners in the chain, farmers can borrow value adding equipment when necessary, access warehouses, sell at the prevailing market price and gain access to important information without being exploited. In many supply chains, trust and reputation of relatively small actors can act as a safeguard against opportunistic behaviour. Even general supply chain management theory supports that the powerful and influential actors should distribute value added and profits along the chain to develop as a whole (Ras & Vermeulen, 2009).

In summary, the above section debates how different implementations of added value to a product can both improve and hinder an actor`s overall performance. More precisely, it has been advocated that intrinsic and extrinsic value affects the economical and overall performance of an actor. Medium and smaller actors may struggle in mastering the standards and requirements set by the downstream actors of the modern global chain. However, involvement with cooperatives and/or GVC`s can assist them in the right direction (Pietrobelli & Rabellotti, 2011), provided this relation possesses the characteristics of a healthy chain; transparency and collaboration (Christopher, 2016).

### **6.3.3 Governance Structure**

As mentioned earlier, the governance structure between the actors within a supply chain can be distinguished into two perspectives, the transaction cost perspective and the global value chain perspective. When it comes to the transactional cost perspective, it is very important to monitor transactions regularly throughout the supply chain (Trienekens, 2011). This is especially true for countries with higher rates of corruption and lower performance in terms of transparency. Hence, there are information asymmetries between actors and inadequate communication infrastructure makes it more difficult to monitor the transactions.

Ethiopia has developed significantly in the past 10 years, and is developing in several areas including improving the state of corruption and infrastructure. It is still arguable that prevalence of information asymmetries between the intermediaries and the smallholders occurs (JU 1 & 2, 2020). As mentioned previously, this exploitation solely benefits the intermediaries which induces the wastage and the economic burden onto the other actors in the chain (see figure 8). This exploitation by the intermediaries is only possible because of information asymmetries and inadequate communication infrastructure as the smallholders do not have any information about the actual price of their product in the market.

On the other hand, the literature advocates that the government can disrupt this type of exploitation through opportunistic behaviour by introducing certain governance instruments such as legislation. There is evidence which suggests that the government has tried to intervene in the industry, but has not yet solved the issue (JU 1). Other solutions presented by the literature include, for instance, the introduction of standardisation on certain specifications such as quality. This is the type of benefit that emerges through relations with the GVC and interaction with cooperatives.

Moreover, when debating governance in relation to the transaction cost and information asymmetry, a known economical phenomenon needs to be examined, namely the principal agency theory. As stated earlier, this is due to the existence of information asymmetry, which enables one actor to exploit the other through opportunistic behaviour. In an ideal world, this issue can be solved through one out of two solutions. 1) Improve the information circumstances, thus reducing/eliminating the information asymmetry, 2) Introduce specific contracts which govern this opportunistic behaviour. However, these simple solutions are not applicable in this case as the information asymmetry is present due to the inadequate communication infrastructure, which is expensive and time consuming to improve. In addition, the imbalance in bargaining power between the actors makes it extremely difficult to negotiate this sort of agreement.

The above problem of imbalance in bargaining power between the actors throughout the chain can be solved with the help of collaborative agreements. The GVC perspective focuses on the lead firm, power relationships and distribution of

value adding activities in the supply chain (Gibbon, Bair & Ponte, 2008). By applying the reasoning behind GVC perspective, the suppliers are differentiated and ranked, determining how and what type of interrelationship the actors should maintain. In our case, the category “commodity supplier” is relevant as it signifies an arm’s length relationship where the commodity producers hold little or no bargaining power. Thus, the business conditions favour the leading actor. Again, these settings initiate the possibilities of exploitation of “weaker” actors, as discussed earlier. Note, even though the conditions for exploitation might be present, it does not necessarily mean that the favourable actor will utilize these conditions (Ras & Vermeulen, 2009). Still, formation and interaction between the horizontal actors as a cooperative can increase the bargaining power of the commodity producers and decrease the transaction costs for retailers (Expert 1, 2020; Francesconi & Heerink, 2010).

In summary, this section has debated how to govern a chain both through the GVC perspective and the transaction cost perspective. The common denominator is that the business circumstances are favouring the actor with market power, thus leading to the emergence of exploitation. There are limited incentives for the exploiter to collaborate and improve their interrelationship with the other actors. The government has tried to intervene, but has not yet succeeded on this issue. However, we argue that other global actors can enter and change this situation. Likewise, horizontal collaboration through trust-based relationships can also alter and induce the smallholders power situation.

#### **6.4 Value Chain Upgrading**

As argued earlier in section 4.4, most cases concerning upgrading of supply chains are dependent on several business aspects. Trienekens (2011) has grouped different upgrading options based on the supply chain elements from his framework, thus reaching a conclusion of three main upgrading options; 1) Upgrading of value added production 2) Upgrading of value chain network structure and 3) Upgrading governance form. Below, a detailed discussion is presented on the different categorisations in order to investigate the possible upgrading options for the FPSC in the case of mangoes.

### 6.4.1 Upgrading of Value Added Production

Substantiated in section 4.4 the literature concerning upgrading is focused around value added production (Trienekens, 2011). This can occur through different forms, however, the first two - value chain process and product upgrading - are the most common methods in developing countries. In terms of the upgrading of products and packaging, it is all dependent on the potential demand in the market. Figure 6 gives indications of several ways of adding value to a product in the supply chain of food.

In the interviews with the actors located in Awash, we touch upon the topic of Fairtrade and other certifications such as organic production. Such attributes to a product (this case mango) can increase its value in the right market (AJ 1, 2020). The findings reveal how the keywords are “the right market”. As debated earlier, a greater demand has been observed for products which are produced and processed in alignment with sustainable reasoning in more developed markets such as the western market. The debate here concerns how an actor can add the suitable additional value to its products/process for the customer. Thus, it is suggested that the local smallholders categorised within the A-system need to fulfil the local value added requirements. Whereas, an actor within the C-system needs to adapt to the market of interaction, which is the export market. In other words, it is important for the businesses in Ethiopia to examine the effects of the attributes that add value to the product/process in the targeted market. For example, the realization by africaJUICE to dissolve their Fairtrade certification due to the requirements of their targeted market (AJ 1, 2020).

Considering the upgrading of processes in the fresh produce supply chain, several factors were encountered. Based on the insight from the experts at Jimma and the other practitioners at Awash, one can look at the process of mangoes as two distinct stages. 1) pre-harvest 2) harvest and post-harvest. At the pre-harvest stage, the focus is on helping the plant to grow the fruit. Whereas the harvest stage is the process of the actual harvesting and the post-harvest is all processes after harvest.

The reasoning behind the first stage; pre-harvest, is to build a strong foundation which is a precondition to producing high quality fruits and achieving an efficient



yield (AJ 2, 2020). In other words, to have a strong and efficient tree, it needs to be planted using the right techniques and given the nutrition it needs to produce healthy fruits. At this stage, there are several ways of improving the tree's performance, in terms of applying knowledge such as pesticides and fertilizers. This is being done in the certain areas of Ethiopia (AJ 2, 2020), but not at the sufficient level. Thus, in order to improve the condition of smallholders, increase overall efficiency and performance, this knowledge needs to be shared between the actors. In other words, the bigger and more resourceful actors must look beyond their own interests and collaborate with the smallholders in order to increase the overall performance of the supply chain.

At the harvesting and post-harvest stage, there are numerous options one can upgrade; how to pick and harvest, how to store and transport etc. However, most losses occur as a result of the inadequate utilization of resources and infrastructure. On one hand, inadequate utilization means that the actors possess knowledge and experience, but it is not possible for them to utilise that information efficiently due to the absence of resources. On the other hand, sometimes the resources are available but the actor cannot utilise the resources efficiently due to lack of adequate experience. These issues can be solved through the following solutions; 1) Get the necessary infrastructure, 2) Gain the appropriate knowledge. Although these solutions may sound simple, they are hardly applicable in this case as the smallholders have limited capital to invest in new infrastructure (AJ 1, 2020; JU 2, 2020). In addition, to gain this appropriate knowledge, the smallholders are required to develop relationships by interacting and involving themselves with other actors. As proposed, cooperatives and interrelationships with GVC's may present a suitable solution for these issues. Note that it is important for all the actors to follow the reasoning behind best practice supply chain i.e. knowledge sharing and transparency.

To conclude "upgrading of value added" two key options were presented; value chain process and product upgrading. In relation to product upgrading, the debate concerned how an actor can add suitable additional value to its products/process for the customer. Alignment towards the value addition, in relation to the market served and its demands has to be ensured. A smallholder characterised as an A-system has different incentives to add value compared to a bigger actor in a C-system. The

upgrading of processes is related more to quality, where the actor's main issue is present due to inadequate utilization of resources and infrastructure. This means that the actors possess knowledge and experience, but it is not possible for them to utilise that information efficiently due to the absence of resources. However, there are times where the resources are available but the actor is unable to utilise the resources efficiently due to lack of adequate experience. In those situations, knowledge sharing between actors, in addition to relations with cooperatives and/or GVC`s may present a suitable option.

#### **6.4.2 Upgrading of Value Chain Network Structure**

According to the framework, upgrading of network configuration refers to both horizontal and vertical relationships within the chain (Christopher, 2016; Trienekens, 2011). When upgrading the vertical chain, it is connected to changing or getting access to the right market channels. Furthermore, the typical smallholder can be categorized within the A-system, thus selling through intermediaries is their main market channel (Ferede & Gemechu, 2006). As argued earlier, the combination of unfavourable conditions; market power, infrastructural circumstances etc. enables other actors in more favourable positions to exploit the smallholder.

In order to upgrade the network structure, the smallholders have limited possibilities but it can be done by altering the composition both horizontally and/or vertically. To gain access to the right market channels, the vertical structure allows the smallholders to interact with the right actors in the vertical chain (Trienekens, 2011). In order for a smallholder to improve their position in the network structure, a suggested method is to upgrade their vertical position. This upgrading allows the smallholders to gain access to the appropriate market through a more suitable market channel, which is present because of the relationships between other actors vertically. Bear in mind that horizontal collaboration between smallholders can lead to cost sharing of infrastructure which improves their ability to access and enter the appropriate market. However, vertical collaboration such as relations with a GVC can help in gaining access to the right market channels (Pietrobelli & Rabellotti, 2011). Thus, as suggested earlier, the problem of low bargaining power and exploitation by intermediaries can be solved if there is an increased focus on horizontal upgrading, with some opportunities for vertical upgrading.

Horizontal upgrading is concerned about how collaboration within the horizontal structure can increase performance; through joint selling, shared facilities, joint marketing, etc (Trienekens, 2011). An example of such interaction was observed in the findings where africaJUICE focussed on horizontal collaboration with smallholders by assisting them with issues concerning diseases, pests, fertilizers, etc. (AJ 2, 2020). In case a smallholder is unsuccessful or unable to collaborate with a global chain, cooperatives can be an option which enable horizontal upgrading. The cooperatives can assist farmers in a number of agricultural and value adding activities as discussed before. Thus, we advocate for horizontal upgrading, as in its most advanced form it enables product differentiation combined with value adding activities alongside other sectors.

The possible degree of exploitation faced by an actor is determined by the prevailing circumstances concerning the network structure/composition (Trienekens, 2011). However, by educating the actors within the same channel/system to operate with the reasoning behind best practice SCM, the issue concerning exploitation can be demolished. Following best practice SCM, the attributes shared among the actors should be transparency, collaboration and collective action to work as one to compete against other chains. In other words, to realize and operate as Christopher (2016) pinpointed; “Supply chain vs. supply chain”.

In conclusion, to upgrade an actor's position in its network configuration the actor needs to determine where they want to upgrade; horizontally or vertically - both can be done simultaneously. An actor can vertically upgrade by getting access to a better market channel, in relation to our case we observe two distinct paths. A bigger actor with market power and sufficient infrastructure can dictate its own market channel (locally), whereas a smaller actor (the smallholder) does not possess the same power and lacks infrastructural resources. The smaller actors are exposed to exploitation, and have little means to avoid or improve their situation. However, connection to a GVC or cooperatives can alter their means to do so. In relation to horizontal upgrading we observe the same trend, those with the means to alter their own position and those with limited possibilities. Again, the smallholders with

limited possibilities can utilize collaboration and cooperatives to enhance their position.

### **6.4.3 Upgrading of Governance Structures**

The tendency towards transformations regarding governance structures has been observed in developing countries (Trienekens, 2011). Export-oriented producers are starting to become producer-exporters, and there is a need to continue this trend. It was observed that instead of focussing on just export, the actor had transformed itself into a producer-exporter (AJ 1, 2020). One-third of their sales were exported whereas the rest was sold locally, which meant that they were producers and exporters, thus being producer-exporters. As a result, the chains of producer-exporters have a tendency of being shorter by having fewer actors, which results in lower transaction cost, better handling and more control compared to others (Trienekens, 2011).

There is still limited tendency for such development for the smallholder from the A-system - which is the majority of the actors in the national industry. The chain needs to reduce the handling, transaction costs and gain more control of the whole chain to enable sufficient overall performance. The government has been trying to intervene, however, they have not been successful (JU 1, 2020), which advocates that they need to continue their efforts by implementing better strategies. Furthermore, the actors involved can also implement suitable solutions such as, creating reasonable contracts, entering into cooperatives, trading with GVC etc. Note, as discussed earlier in section 6.3.3, the simple solution to principal agency theory phenomena, which is present here, is not easily soluble.

Furthermore, the need to have standardizations and certifications in food chains can be another solution to upgrading of governance structures. On one hand, having certifications assists the export process of products to markets that appreciate this value added, as discussed earlier. In addition, standardization in food chains is important to reduce wastage as well as increase the value added. As observed in the findings, there is a need for standardization in the training and education of farmers to make the post-harvest process more efficient (JU 3, 2020). Furthermore, as no quality standards are set by the intermediaries, there is a lack of incentives for the

other actors to add value to their products and processes (AJ 1, 2020; JU 2, 2020). The implementation of standardizations can prove to be an important factor in business relationships between actors, thus it is important to consider measures to upgrade them. Thus, relationships to GVC and corporations should be considered as discussed earlier (Gabre-Madhin & Goggin, 2005; Pietrobelli & Rabellotti, 2011).

In summary, it has been advocated that the trend towards producers-exporters is emerging, inducing the reduction in transaction costs within the targeted chain. In addition, it has been highlighted how both standardization and certification can improve the upper streams relation to the downstream. Furthermore, it has been underlined that the typical solutions for principal agency theory have insufficient affect in these circumstances. Lastly, cooperatives and GVC`s prove to be the suitable answer in upgrading these measures.

## 7.0 Conclusion

We have in this thesis examined the post-harvest losses of mango in the FPSC in Ethiopia. This was done by applying the framework presented by Trienekens (2011). The framework was chosen as it enables us to get a more comprehensive and wider scope of the case compared to the more general methods.

Overall, the findings are similar to the literature; pinpointing how excessive handling, exploitation of other actors and inadequate infrastructure are key factors for the wastage. However, the findings illustrate how these factors are present, not due to the smallholders' practices, but because of their surrounding circumstances and lack of successful government intervention. Our findings explicitly differentiate the recognized actors into two distinct systems; 1) the A-system (most common) and 2) the combination of the B & C-system (bigger actors).

We argue how the actors can improve their performance by altering the smaller actors' position - horizontally and vertically. They have limited possibility to alter their position in the market configuration, they are therefore recommended to form collaborative agreements through cooperatives to enhance their horizontal position, or form relationships with global actors to improve their vertical position. In addition, there is a need for continuous government involvement in the industry to focus on reducing the constraining factors and facilitating for future growth. Lastly, to truly improve the performance of the local chains, incentives throughout the whole chain needs to be initiated between the actors. There is a need for all actors within the chains to realize and utilize the reasoning behind best practice SCM - where transparency, collaboration and value sharing are present.

Overall, we suggest that the losses can be decreased by implementing the following:

- Employ sufficient investments in basic adequate infrastructure; at a governmental level, in addition to individual smaller investments; tools, vehicles, land etc.

- The industry needs to focus on increasing the marginal value of mangoes. With an increase in value the profits will increase. This increase in profits will incentivize the actors to reduce wastage.
- All actors and practitioners must contribute to realize and utilize the reasoning behind best practise SCM. Thus, recognizing how the incentive to improve the overall performance of the chain is embedded within best practise SCM. Bigger and more powerful actors must take responsibility to substantiate a good business environment.
- Smaller actors must take responsibility for their own situations, not being dependent and expecting governmental resolution. Even though the smallholders are in a disadvantaged position, their situation can be altered by collaboration with a cooperative and/or a GVC.

### **7.1 Future Research**

The thesis was constricted to a certain geographical area in Ethiopia as mentioned in the case boundaries. Future research should consider the potential possibility of exploring other areas in Ethiopia, for example, Asosa for mango production. This will enable researchers to investigate further into the FPSC of mangoes in other areas of Ethiopia. Furthermore, the thesis focusses on improving the post-harvest practices, however, further research on pre-harvesting practices might extend the explanation of wastage within the FPSC of mangoes. Future studies should also investigate the Trienekens (2011) framework in order to adapt contemporary terminology from SCM literature, which will enable the researchers to confirm its relevance.

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## 9.0 Appendices

### 9.1 Appendix



### 9.2 Appendix

Search Strategy:		
Parameters:	Subject terms, synonyms and restrictions	Broader alternatives if relevant
Language	English	Possess the possibility to collect and interoperate Hindi and Norwegian
Methodology	Qualitative	Abductive approach
Subjects / Search terms	<ul style="list-style-type: none"> <li>• FSCM</li> <li>• African SCM</li> <li>• SCM Collaboration</li> <li>• Principle agency theory, supply chain</li> <li>• Infrastructure SCM</li> <li>• Infrastructure Africa</li> <li>• Infrastructure Ethiopia</li> <li>• Handling in Africa</li> <li>• Intermediaries</li> <li>• Technology in SCM</li> <li>• Communication supply chain</li> <li>• Post-harvesting, harvesting</li> <li>• Packaging</li> <li>• Handling</li> <li>• Diseases</li> <li>• Globalization</li> <li>• Micro and macro trends</li> <li>• Wastage in fresh produce</li> <li>• Global Value Chain</li> <li>• Cooperatives</li> </ul>	Other relevant supply chain management theories
Business sector / industry	Agriculture, Fresh Produce	Other key aspects characterised within developing countries
Geographical area	Ethiopia; Jimma, Addis Ababa and Awash	Developing countries in focus and Worldwide
Literature Type	Non-specific	
Publication Period	Newer research: 2000 - 2019	

## **9.3 Appendix**

### **Interview Guide Farmers**

Key information:

1. What is the size of your farm?
2. How much do you produce from that land? What is your yield?
3. Do you find the buyers or do they come to you?

### **Interview Guide**

1. What is your role within the supply chain?
2. How efficient/productive is your part of the supply chain?
3. Which actors/factors are responsible for the inefficiency?
4. What do you think is the solution?
5. Who do you think are your customers?

### **Interview Guide Experts**

1. What is the role of different actors within the supply chain?
2. How efficient/productive is their part of the supply chain?
3. Which actors/factors are responsible for the inefficiency?
4. What do you think is the solution?

### **Interview Guide africaJUICE (Downstream)**

Key Information:

1. How much do you buy and produce?
2. Where do you produce most of your products?
3. What is your procurement process?

### **Interview Guide**

1. What is your role within the supply chain?
2. How efficient/productive is your part of the supply chain?
3. Which actors/factors are responsible for the inefficiency?
4. What do you think is the solution?
5. Who do you think are your customers?

In the key information section, we aim to identify the size of the interviewee and their relationship with other participants within the supply chain. After that, the general interview guide is created with the same reasoning behind the definition of

a semi-structured interview. Meaning, it allows us to dig deeper into the issues and at the same time enables us to ask follow up questions as we go through the interview.

#### **9.4 Appendix**

<b>SCM</b>	Supply chain management
<b>FPSC</b>	Fresh produce supply chain
<b>FAO</b>	Food and agriculture organization
<b>UN</b>	United Nations
<b>AAA</b>	African Agribusiness Academy
<b>PTR</b>	Preliminary thesis report
<b>FDI</b>	Foreign direct investment
<b>VCA</b>	Value chain analysis
<b>SDG</b>	Sustainable development goals
<b>IT</b>	Information technology
<b>GVC</b>	Global value chain
<b>FVCA</b>	Food value chain analysis
<b>CSR</b>	Corporate social responsibility
<b>ECX</b>	Ethiopian commodity exchange

#### **9.5 Appendix**

The creation of this thesis was only possible as the researchers and their academic institution were collaborating and cooperating with the recently established

“SUSTIAN PROJECT”. In the following paragraphs more information concerning the SUSTAIN PROJECT is given.

BI Norwegian Business School in Oslo, the School of Business at Mzumbe University (MU) in Tanzania, and the Business and Economics College of Jimma University (JU) in Ethiopia have created a partnership called SUSTAIN. Through the partnership, the schools strive to improve the quality of education and research in the fields of supply chain management (SCM) and sustainable business development. These efforts will enable all three schools to work toward achieving the United Nations’ Sustainable Development Goals (SDGs), which call for the world’s institutions to work together to end poverty, protect the planet, and ensure that all people enjoy peace and prosperity (BI Norwegian Business School, 2020, para. 1).

Funded by the DiKu NORPART program, SUSTAIN promotes international understanding, intercultural competence and builds international networks for academics and students through student and faculty mobility. By the end of the project in 2023, SUSTAIN will have created an opportunity for more than 100 students to go on long- or short-term exchange. Caroline Ditlev-Simonsen, professor in sustainability and corporate responsibility, is responsible for the collaboration with Mzumbe, while Marianne Jahre, professor in supply chain management, is responsible for the partnership with Jimma (BI Norwegian Business School, 2020, para. 2).

BIs partners are important institutions in their countries. At Mzumbe, about 1,700 of the 10,000 students are in business; the school is known for its capacity in management, governance, and health management, but it needs development in the areas of entrepreneurship and supply chain management. In comparison, Jimma is Ethiopia’s largest public university, known for its strength in health education. Of its 50,000 students, 6,250 are in business. In addition to exchange, SUSTAIN reviews existing and develops new teaching programs and courses at the three schools, organises conferences and seminars involving key stakeholders (BI Norwegian Business School, 2020, para. 3).