

Coffee supply chains
and operations
growers marketing
essay



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ABSTRACT

The Coffee Supply Chain is a detailed process that is difficult to encapsulate. It is this paper's aim to identify several of the supply chain operations characteristics that are critical to the distribution chain of coffee worldwide. Several areas of the supply chain are discussed, from detailed analysis of supply chain constituents, to demand, markets, analysis of consumers, metrics, and obstacles. We look at the supply chain from a worldwide perspective, to capture what is essentially a global process. As coffee is exported from developing countries to developed ones, several dynamics including fair trade, organic products, and overproduction are discussed.

IN 1999, Coffee consumption was consumed at a rate of 2. 25 billion cups per day (Ponte). As the world's second most traded commodity behind petroleum (House), coffee's importance as a worldwide product is undeniable. The details of the supply chain that compose the vast network that accompanies this worldwide product encompass several components, all of which require in-depth analysis. Before such an analysis can be considered, it is necessary to elucidate the process from which coffee cherries find their way to the mugs of our everyday Starbucks lattes.

Coffee goes a long way and changes many hands from bean to cup (Ponte). The supply chain begins with growers, goes through a number of intermediaries before making it to processors, then must often deal with government agencies before making it through an exporter, which deals the coffee with dealers and brokers, who then proceed to process the coffee

through roasters, who package the coffee and deliver it to retailers. (Industry).

To the left is one example of the possible models in expressing the way in which the individual components of the coffee supply chain can interact.

The Constituents of the Chain:

Growers

Figure -A General structure of the global coffee-marketing chain. Taken from (Ponte 2002) The Coffee supply chain cannot begin without the hard labor of its growers, the men and women who select warm and humid areas of the globe to pick areas where coffee cherries are placed in ideal conditions for growth (Industry). Often these are smaller areas of land that are then tended to until the time is ripe for picking. Picking is often carried out by laborers, who are generally able to pick up to 100 to 200 pounds of cherries on a given day. Only 20% of this weight, 20-40 pounds, is actually the seed, which is what we know as the coffee bean (TLC Cooking). In some areas which are flat, such as Brazil, the coffee cherries are picked mechanically. Places that pick by hand generally selectively pick red, or ripe, cherries, while mechanical ones pick the entire crop. The growers and pickers most rotate every 8-10 days searching for cherries at the peak of ripeness. The picking of the coffee trees are very labor intensive and a difficult job because of the rough, sometimes mountainous terrain. In most countries, the growers harvest their crops once a year but there are a few countries that have two flowerings that produce a primary and secondary crop. Most growers have formed cooperatives in recent years to try to increase their revenue from the

coffee farms. The farmers belong to a cooperative that sets the premium price for their products and sells them directly to exporters or fair trade organizations. The cooperatives not only try negotiating higher prices but also try to increase the quality of life for the farmers.

Intermediaries

Often, coffee growers are then generally combined into collectives, as discussed later, or face dealing with middlemen who deliver the coffee cherry product to the processor.

For a formal definition on a cooperative, the ICA defines this as:

“ An autonomous association of persons united voluntarily to meet their common economic, social and cultural needs and aspirations through a jointly owned and democratically controlled enterprise.” (Tilahun 2007)

While the impacts of globalization on the coffee supply chain cannot go ignored, even at the local level growers are faced with a plethora of decisions and issues in terms of how best to sell their crop. A good discourse on cooperatives and the issues that they face can be found in (Tilahun 2007):

“ Forming a cooperative will not automatically solve business problems faced by individual households. This is because of cooperatives are subject to the same economic forces, legal restrictions and international relations that other business face. Cooperative members’ expectations about the types and quality of services that should be offered and their criteria for

performance of these services have a major impact on the level of satisfaction or dissatisfaction felt.”

Intermediaries exist in various stages in the coffee supply chain; they are the middle men between the various links in the chain. Intermediaries usually buy the coffee cherries directly from independent farmers and sometimes cooperatives. They collect as much coffee cherries as possible then in turn sell it to processors. Sometimes they have the means to process the coffee cherries and sell it to auction houses or directly to exporters or roasters.

Processors

Eventually, through whatever Intermediary, the picked cherries are delivered to the processors. In order to remove the coffee bean from the coffee cherries, processors use one of several pulping techniques, most commonly through machine separation, to complete this task.

Processing the coffee cherries or fruit is a very important part of the supply chain; it converts the cherry into coffee beans to be exported. Processing the coffee fruit requires specialize and expensive machines, limiting growers' ability to process their own harvest. However, some cooperatives are able to process the beans and sell it directly to an exporter or auction house. The processor buys the coffee from the cooperatives that can't do it their selves or from intermediaries in the supply chains. First the coffee cherries go through a processing stage then followed by the milling stage before it can be roasted.

The coffee fruit go through a wet or dry process. In the wet process a lot of water is needed and specialized machines. The coffee cherries are dumped <https://assignbuster.com/coffee-supply-chains-and-operations-growers-marketing-essay/>

into water, bad cherries will float and the good ones will sink. The ripe cherries are pushed through a screen in the water to remove the skin of the cherry and some of the pulp. The remaining pulp is removed by fermenting and washing or machine-assisted wet processing. The pulp is removed by fermenting it with microbes and then carefully washed in tanks or machines after the parchment surrounding the beans is at the desired texture.

Machine-assisted wet processing removes the pulp with mechanical scrubbing. After the pulp is removed, the parchment beans are dried to 10% water content by the sun or by machines. In the dry process, the harvested cherries are cleaned then dried in the sun. The cherries are cleaned by winnowing using a large sieve to remove dirt, soil, trigs and leaves. Then, the coffee beans are spread out in the sun to dry and routinely rake to allow even drying and the prevention of mildew.

Finally, the beans go through the milling stage after processing to remove the last layers of the dry skin. The first step is the hulling process to remove the last remnants of the dried fruit or parchment. This is done with machines that gently hit the beans to remove the fruit and produce the green beans. After that, various machines are used to sort the beans by density and size of the coffee beans. Some machines blow the beans in the air and determine the size from the bins that they fall in relative to the blower. Another machine separates them by size using numerous sieves. Also, there is a gravity separator that shakes a tilted table, leaving the heaviest beans on one side and the lighter ones on the other. The last step in the sorting process is color sorting. This is best done by hand for premium brands but also machines can automate the process. Finally, the coffee is graded by

various criteria and stored before it is sold to an exporter, auction houses or roasters.

Government Agencies

Government Agencies have become increasingly involved within the coffee supply chain particularly within developing countries. This has become an increased concern overall primarily due to the high profile of coffee as a significant backbone of developing economies. Typically, it is the source of up to 2/3's of most developing countries' total employment (Tilahun 2007). Consequently, a great deal of a developing country's GDP is dependent on the export of coffee, and is hence subject to Government regulation. The particular fall of coffee prices in the late 1990's led to " worst coffee crisis ever seen in terms of growers income" (Osorio, 2004), which serves as a prime example of the rationale behind government intervention in the supply chain.

Some governments and government agencies buy the cherries from farmers or processors directly and then sell it to exporters or brokers. Other regulate where exporters or brokers can buy the coffee beans. In Ethiopia by law, all coffee must be either sold at auction or through deals with the various cooperatives.

Exporters/Brokers

Exporters are tasked with the business of taking the processed dried seed coffee and exporting it to the country of consumption. While a portion of the produced coffee may be consumed locally, in most cases, developing countries export their coffee product abroad to developed countries, where

the majority of the world's coffee is consumed. In the U. S. alone, there is an average estimate of 400 million cups of coffee consumed per day (Ponte 2002). The high amount of demand outside the respective growth countries allows for exporters to essentially serve as a fundamental link within the supply chain.

The exporters buy the green coffee beans from the cooperatives, auction houses or processors within the countries. Next, they ship the coffee to importing countries with high demand. The exporters sell it directly to roasting companies or to importers with the help of brokers; importers store it as inventory to sell gradually to fulfill smaller orders. Brokers have to be able to supply exporters with the right roaster or importer contacts at the right time. They are crucial because they are very knowledgeable about clients in their country. Also, brokers work with larger coffee plantations or farms to export their own product and secure deals with roasting companies in other countries.

Dealers/Brokers

On the other end of the export, it is vital to have those who import in the coffee into the respective countries. Often in many cases directly associated with a roaster, this middleman is either cut out or completely integrated into the chain.

Roasters

Roasters take the green coffee beans and turn it into the product that the consumers use and drink. It is usually a separate link in the supply chain but some retailers roast their own coffee beans. Roasting is done close to where

the coffee will be distributed to maximize its shelf life. The roasting process involves sorting, roasting, cooling packaging and sometimes grinding in the larger roasting operations. The bags of coffee are opened in hoppers and screened to remove debris. Next, they are taken to roast between 370 and 540 degrees Fahrenheit in roasters for up to 30 minutes depending on the desired roast level and flavor. Roasters are horizontally rotating drums that can be heated from below directly or indirectly. After roasting, the beans are cooled using a vacuum system and stabilized by degassing. Lastly, the coffee beans packaged in special foiled bags with aromalock valves to allow the gases to escape while protecting the coffee beans.

Taxation on roasters is another consideration that must be made here. In Germany, taxation on coffee has been primarily a burden of roasters, as growers faced no tax on green coffee, while roasters did (Feurstein 2002). Packaging the roasted coffee and in some cases grinding the coffee are tasks that can be accomplished at the roasting factory.

Distributors

Finally down to a level that is common to most other supply chains, the distributor plays the critical role of taking the roasted and finished product and distributing it to the appropriate retailers. The role of distributor and retailer may vary from operation to operation, as coffee products are handled differently by company.

Retailers

The role of retailer differs from company to company, as there are two primary means of coffee sales to customers, coffee stores and retail outlets.

In the case of coffee chains such as Starbucks, coffee is directly served to the customer with added value. In the case of companies such as Maxwell House, the primary method of sales is through the sales of packaged coffee beans.

The Customers:

The customers of coffee encompass most of the developing nations of the world. For better reference, figure 1-F is a clear picture on both the production and consumption of coffee. There are several attributes that can be stated for the average coffee customer. One would be relatively affluent, or at least well off enough in order to afford the luxury of coffee within his country. Two, the customer would generally not be willing to tolerate long wait times to receive a desired cup, but perhaps sometimes able to wait for a gourmet item, ie. Jamaican Blue Mountain. A high level of service is generally expected from direct coffee retailers, as well as the availability of generally a high variety of coffee products. It is not uncommon to see several types of beans from various countries available at a given coffee retailer, although it is not always the case. Coffee retailers are generally expected to have a continuous supply of products, and direct outlets could face negative customer reactions given a shortage or backlog of expected products. Customer segmentation is generally handled by the offering of several styles of brewed coffee at direct retailers, ie. Black standard American coffees versus dark cherry mocha flavored beverages. Customer price expectations on coffee have generally averaged out to around \$1.38 a cup within the United States. Worldwide, coffee prices differ by country and demand, which will be discussed later.

Characteristics of Coffee

The characteristics of coffee are highly dependent on several factors, from the type of bean, Arabica to Robusta, to the elevation and climate that the bean is produced in. Then, there are a slew of differences in the roasting process to the final brewing. Coffee is generally desired for a couple of distinct characteristics. The aroma of the beans and resulting brew is of utmost importance to a successful coffee product. The flavor from a resulting brew is important as well as the caffeine that is inherent in its extraction. Coffee plants take approximately 3-4 years before producing coffee fruit that can be harvested for the production of beans, which places a severe time limitation on the speed of coffee production. Regardless, major problems with surplus growth were noted in the early 2000's, due to its rising popularity as a cash crop.

Product Strategy

In terms of product strategy, there are several that are available to be discussed. For our purposes, we will focus on specific case studies to better understand possible coffee product strategies. In order for Starbucks to maintain a " Fair Trade" Image, Starbucks utilizes the Café program.

" Participation in the CAFE' Practices Program demands that suppliers meet minimum requirements for both quality and ' economic accountability'. This requires full traceability of coffee from individual producers to Starbucks, and also what Starbucks considers to be acceptable levels of ' equity' in distributions of profit across the supply chain. " (Macdonald 2007)

Essentially, one of the key elements in regulating the supply chain in the case of a corporation with as much name-recognition as Starbucks is to indirectly manipulate elements within their own supply chain to its benefit.

“ Compliance is promoted not via a regulatory code specifying and enforcing minimum standards, but rather via an incentive system designed to promote progressive change, in which performance against specified standards of sustainable practices are rewarded by provision of preferential contracts and in some cases the payment of price premiums.” (Macdonald 2007)

Coffee Demand

For estimating the demand of coffee one needs to think about it for the long term purpose rather than short term because it is a medium to long term crop. It usually takes three full years to obtain one coffee crop, so coffee growers need to make a decision about coffee based of medium to long term estimate of demand. The consumer demand for coffee is ever increasing and as the consumption is increasing quality and value of coffee becomes very important.

The coffee demand can be estimated with the help of consumption of coffee. According to the International Coffee Organization (ICO), there has been a lot of changes in the demand and consumption of coffee from 1995 to 2006. In the year 1996 the world has consumed about 96. 5 million bags where as in the year 2006 the consumption has increased to 116 million bags so there was a total increase of 20 percent in the consumption of coffee which implicitly increased the demand for coffee.

Information regarding the estimation of demand for coffee throughout the world is not known, only the demand for coffee in some countries is studied. They are United States of America, Mexico, Netherlands and Sweden. These following countries are highest coffee consumers and account for about 30 percent of world coffee consumption.

A standard log linear function is estimated, where the demand for coffee in per capita terms for each country during each year, is designed as a function of the country's per capita income. The factors that affect the countries coffee demand such as local conditions and cultures are also taken into account when doing the formulation, which are called as fixed effects. Apart from this the effect of world market and change of prices for the substitute of coffee and other factors are also taken into account for the formulation which are called as year effects. Finally the formulation looks like

$$\log(C_{it}) = \alpha + \beta \log(Y_{it}) + \gamma \log(P_{it}) + \delta_i + \epsilon_{it}$$

Where C_{it} is the i 's per capita consumption of coffee at time t , Y_{it} is income per capita in US

Dollars in country i at time t , P_{it} is the relevant price for coffee of country i at time t in US cents/ pound, δ_i is country fixed effects and ϵ_{it} is year effects [1].

The demand for coffee can be explained with the help of the some factors.

Change in the Consumer Habits: the first coffee that was available in United States was either decaffeinated or roast which had many consumers, but this trend had changed by the end of early of 1980's. There was a good amount
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of reduction in the per capita consumption of the existing flavors which paved a way for other flavors. These new flavors that were developed were not entertained by the dominant main stream coffee companies. But after the success achieved by the small stream retailer stores, these companies also started producing coffee which had a high profit margin.

The new types that were available were gourmet, organic, flavored, dark roasts, espressos and appellation types. All these coffees which gained demand due the fact that they were easy to prepare and were cheap. Among these espressos were leading which had varieties like cappuccino and lattes. These new coffees had increased the demand in the market from 9% to 13% in 2002 representing 24 million adult coffee drinkers.

Consumption in Coffee Producing Countries: Coffee producing countries consume coffee up to 25% of the world demand with Brazil being huge producer followed by Indonesia, Columbia, Ethiopia, Mexico and India. The demand for coffee in Brazil has doubled in the past 2 decades making Brazil the second largest consumer of coffee after United States. The coffee consumption in Columbia has been declining recently due to economic and domestic concerns. The coffee consumption in Mexico is improving though it has a poor coffee quality. The coffee consumption among the Asian region was ruled by Indonesia until the Asian economic crisis but after the crisis the consumption of coffee has fallen to 1.3 million bags and now again is regaining and is at 1.7 millions. The second largest consumer in Asia after Indonesia is India where the demand for coffee seems to be increasing. India is primarily a tea drinking country but this trend seems to be changing with the demand for coffee.

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Markets:

The markets for sustainable coffee usually come from the following regions, they are:

The United States

Western Europe

Japan

Sustainable coffee: is usually referred to organic, fair-trade and eco- friendly coffees but now a lot of new entries are also included in them. These sustainable coffees are almost in all of the markets now. The sustainable coffee is not only beneficial to the growers but also to sellers which make them the most sought after for coffee. Among sustainable coffee the ones that are famous in the United States and Canada are organic, which have the highest sales amongst the three of them. Fair-trade is making faster progress now, which is the same case with eco-friendly, but progress in the case of eco-friendly is much faster than that of fair-trade. A total of 85, 000 bags of these types of coffee were sold in the year 2000 and 147, 000 bags were sold in the year 2002. There has been an increase of two times the bags sold in 2002 when compared to 2000.

In Europe fair-trade has a lot of demand along with organic. Eco- friendly has recently been introduced but have made small progress. The case is the same with Japan, where Eco-friendly was recently introduced as well as two other types of sustainable coffees. Japan was the third largest consumer of sustainable coffee in the world after the United States and Germany.
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Approximately 83, 000 bags were sold in the year 2002. The table below shows us the sales of sustainable coffee in European countries.

Figure 2-Volume and share of sustainable coffees in key European

Markets
Organic: The global market for all organic food and beverages grew every year over the past decade. The retail market for organic food and beverages in the United States grew from \$10Billion in 1990 to \$17. 5Billion dollars in 2000. Now coming to organic coffee in United States, there was an increase of 12% per annum for over 5 years. The North American Specialty Coffee Industry estimated that there was a consumption of over 5, 000 tons of organic coffee in solely the United States in 2000. There was a considerable amount of growth, rates of about 20%, by the end of 2002. In 2001, Western Europe had consumed about 11, 000 tons of organic coffee with Germany in front having consumed 3, 500 tons. Denmark had the highest share of 2. 4% organic coffee in the domestic market in Europe. In Europe the average growth rate for organic coffee was about 10% to 15% every year. The sales of organic coffee in Japan dropped to about 1, 700 tons in the year 1997 but later picked up to 4, 000 tons in the year 2002, making it the second largest consumer of organic coffee in the world after United States. The following table shows the sales of organic coffee in the European countries.

Figure 3-Organic Coffee Sales in select European countries

By the Beginning of 2002 the total number of countries involved in the supply chain of organic coffee was 26 countries.

Fair-trade: The sales of Fair-trade had grown globally to about 16, 000 tons in the year 2002. In North America Fair trade is placed as specialty trade. After the introduction of Fair-trade in North America its sales in the United States has been increased rapidly of about 4, 600 tons of green coffee in 2002 which is nearly 50% growth compared to the year 2001. Canada also experienced a growth from 190 tons in 2000 to 360 tons in 2001. By the end of 2002 it had gone up to 600 tons.

Fair trade was famous in European countries right from the start. Among the European countries the Switzerland, Denmark and Netherlands are leading with sales ranging from 2. 5% to 3%. Japan has a small share when compared to the United States and European countries but is gradually picking up the pace. There was an increase of 17% sales of about 8 tons in the year 2001. There are about 24 countries that have been certified as fair trade producing countries with Mexico, Peru and Columbia leading the production.

Figure 4-Fair Trade coffee in select European countries
Eco-Friendly Coffee: This is a new entry when compared to organic and fair-trade coffee. This was first introduced by Taiwan and has recently achieved national distribution in Japan. This coffee was introduced in late 1990's with only United-Kingdom being its prime consumer. This coffee gained its prominence in the year 2002 with United States, Japan and European countries. About 4, 000 tons of eco-friendly coffee was sold in the year 2001 which came from El-Salvador and Guatemala. There are about 7 certified countries that produce this eco-friendly coffee [2].

Strategies

Over the years, various strategies have been put in place to improve the supply chain. The first one was the developments of the farmer's cooperatives. The cooperatives organized many independent farmers into a collective union. This helped to cut out the middle men for processors exporters. It enabled exporters to buy large quantities of coffee beans without having to contact many individual farmers and repeatedly negotiating prices with each of them. Now the farmers sold their coffee directly through cooperatives and received higher premiums for their crops and processors and exporters had a centralized location to get their supplies. Now they can shop amongst cooperatives with a smaller market to buy from. Governments also regulated the sale of coffee beans more efficiently through the sale at auctions and participation through Fair Trade Organizations. The FTO's help regulate the quality of coffee being produced by designating standards that must be met and labeled. Exporters and retailers can guarantee the quality of their products.

Another strategy being implemented is the increase of new markets in the world and production of specialty coffee such as cappuccinos, lattes and espressos. The Russian and Chinese markets are desirable because it is mostly untapped. The coffee industry is focusing on promotional and marketing activities in these countries. The premium coffee now makes up almost 40% of the coffee market and is priced higher so it would increase revenues.

Drivers

The main drivers in the coffee industry supply chain are information technology, transportation and sourcing. Proper and efficient information systems are essential for every level in the supply chain. At the grower level, access to the internet and information systems will allow farmers to directly link domestic and international markets through the internet. They will be able to compare prices to various exporters and also participate in online auctions of coffee beans. At retail level, sales and demand data patterns help the retailer stock inventory level in anticipation to handle consumer demand. When inventories are low, retailers can place orders to roasters to replenish the diminished inventory. Accurate information systems can benefit roasters and exporters also. It will make the supply chain more efficient, they will be able to forecast demand and only ship or produce the required amount in each market. It can make the exporters more efficient by providing them with different shipping options to meet the requirements. The roasters can be more responsive to the change of demands by changing their roasting patterns and increase the shelf life of their product.

Transportation is another key driver in the coffee industry. The coffee cherries must leave rural, hard to reach areas of the farmers and travel to major cities to be sold at auction or to processors and exporters. Next, it must travel from the processing facility to an exporter that is usually near the water or major transportation hub with an airport. The exporter must then ship the coffee beans out of the country and import it into a much developed country which is usually thousands of miles away. In the producing countries the major mode of transportation is usually trucks or rail

if the country has a developed rail infrastructure. The exporter usually ships large quantities of coffee to other countries but sometimes uses air transportation for quicker deliveries. Once in the importing country, ground transportation is predominantly the form of transportation. Each link must manage the tradeoffs between efficiency and responsiveness to have a successfully supply chain.

Sourcing is another big driving component of the coffee supply chain. The demand for coffee is high in countries that aren't major growers of coffee trees. Therefore, the work to produced coffee beans is sourced out to growers and processor and the retailers do play a major role in producing coffee. Roasters and exporters are working more closely with growers to ensure quality products, stable prices and meet the growing consumer demands

Obstacles

As in any industry, the goal of the supply chain is to align the interests of all members of the supply chain. This is especially difficult in the coffee industry where the origins of supply chains, the growers, are located far away from the consumers in undeveloped countries [coffee industry]. The geographical separation of the growers and consumers present challenges to the supply chain by means of complicated logistics systems and high transportation costs. Fig 5 below (courtesy of CoffeeMarvel. com) provides a visual reference as to where coffee is grown relative to where it is consumed, and it can be seen that consumers are often located thousands of miles from where coffee is grown [coffee industry].

Coffee Consumption Worldwide Map

Figure 5-Distribution of coffee growers and consumers by level of growth and consumption. From Fig 5 and knowledge of coffee producing countries, it is well known that the growing environment of coffee is restricted to undeveloped or currently developing countries. This presents the coffee supply chain with challenge of operating in environments of both political and supply instability. Corrupt middlemen, often called coyotes, exploit growers by providing growers with little compensation for their efforts. Coyotes will also finance the supplies and labor required to grow and harvest coffee to growers at excessive interest rates to further exploit growers [Duke].

Another obstacle of the coffee supply chain is the challenge of keeping costs low while simultaneously meeting the increasing demand for sustainable, eco-friendly, and socially responsible growing of coffee. In the last two decades, many organizations have formed promoting sustainable growth practices and pre-set minimum price contracts with growers. One example of this type of organization is the International Coffee Organization (ICO). In a 2010 report, the ICO listed the obstacles of the coffee industry as; pests and diseases, increased labor and fertilizer rates, lack of quality incentives, increasing amount of regulatory measures related to environmental or public health concerns, and the presence of tariff barriers to added value coffee [ICO].

Metrics affecting the coffee supply chain