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DIPLOMA THESIS

World Production and International Trade in Coffee

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2013

Declaration

I declare that my Diploma Thesis "World Production and International Trade in Coffee" is prepared separately under the leadership of supervisor of the Diploma Thesis and using scientific literature and other information sources that are cited in the work and mentioned in the List of References at the end of the work. As the author of the thesis, I further declare that, in relation to its creation, I did not infringe the copyright of third parties.

Prague 25. 4. 2013 Tereza Pospíšilová

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Acknowledgment

I would like to take this opportunity to thank my thesis supervisor from Department of Economic Development, prof. Ing. Vladimír Jeníček, DrSc., for consultations, willingness, valuable advices and methodological guidance during the elaboration of the Diploma Thesis.

Abstract:

This Diploma Thesis analyses production and trade of coffee. The work is composed into two main parts. The first part – the theoretical one, is written as a literature review. Necessary for understanding the context is firstly characterized the term of coffee, its history, planting and processing. The second chapter is dedicated to the main production regions, customer markets and other than conventional production. Subsequently there is discussed the international trade. The aim of this section is to create an overview of actual facts and figures in the coffee trade, to describe the relationship between producing and consuming areas and the affecting the business by "Big Four". The second part – the practical one, is focused on own investigation. The first objective is the analysis of global coffee chain with its all cooperated and indispensable players. The second objective is the evaluation of coffee development. The future development of the coffee market is based on two pre-selected hypotheses. These hypotheses are confirmed or refuted by comparative methods, statistical analysis of available data and by econometric forecasting methods. At the conclusion, the results of this part are compared to results from practical theories and with conclusions and statements of other authors.

Keywords: coffee, production, trade, producers, price, consumers, fair trade

Abstrakt:

Tato diplomová práce analyzuje produkci a obchod s kávou. Práce se skládá ze dvou hlavních částí. První část - teoretická, je psána jako literární rešerše. Pro pochopení souvislostí je nezbytné nejprve charakterizovat termín káva, její historii, pěstování a zpracování. Druhá kapitola je věnována hlavním produkčním oblastem, zákaznických trhům a jiné než konvenční produkci. Následně je diskutován mezinárodní obchod. Cílem této části je vytvořit přehled aktuálních faktů a údajů v obchodě s kávou, popsat vztah mezi výrobními a spotřebitelskými oblastmi a vliv "Velké Čtyřky" na obchod. Druhá část - praktická, je zaměřena na vlastní šetření. Prvním cílem je analyzovat globální kávový řetězec se všemi jeho spolupracujícími a nepostradatelnými hráči. Druhým cílem je hodnocení vývoje kávy. Budoucí vývoj trhu s kávou je založen na dvou předem zvolených hypotézách. Tyto hypotézy jsou potvrzeny nebo vyvráceny pomocí porovnávacích metod, statistických analýz dostupných údajů a ekonometrických prognostických metod. Na závěr jsou výsledky této části porovnány s výsledky z praktických teorií a se závěry a tvrzeními jiných autorů.

Klíčová slova: káva, produkce, obchod, producenti, cena, konzumenti, fair trade

Content

List of Abbreviations

°C – Celsius degree

CBP – customs and boarder protection

Cm – centimetre

ČTK – Česká tisková kancelář

D.C. – District of Columbia

D.E - Douwe Egberts

DrSc - Doctor of Sciences

EC – European Commission

FAD - Food and Drug Administration

FAO – Food and Agriculture Organization

FLO - Fairtrade labelling organization

FLO - Fairtrade Labelling Organizations International

FT – Fair Trade

ICE - Inter Continental Exchange

ICO – International Coffee Organization

IFOAM - International Federation of Organic Agriculture Movements

IISD - International Institute for Sustainable Development

KC – Coffee C (Arabica)

kg - kilogram

LIFFE - London International Financial Futures Exchange

m - meter

mm - millimetre

Mr. – Mister

NY – New York

NYBOT - New York Board of Trade

NYMEX - New York Mercantile Exchange

NYSE - New York Stock Exchange

P&G - Procter & Gamble

prof. – professor

SCI - The Sustainable Commodity Initiative

SMBC - The Smithsonian Migratory Bird Center

TGE - Tokyo Grain Exchange

U.S – United States

UNCTAD - United Nations Conference on Trade and Development

USDA - United States Department of Agriculture

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1. Introduction

The origin of the world “coffee” comes from Arabian world “qahwah”, which means power and excitement. The Arabs named by this title all beverages including wine, in 17th century. Coffee is one the most popular beverages in the world, together with tea and water. Annually, approximately 400 billion cups of coffee is drunk in the world. Together with oil, natural gas and grain, it is classified into the worlds most traded commodities. Coffee sector employs 25 millions of people around the world and the livelihood of more than 125 million of people is dependent on this plant. In some producing countries, coffee creates half or even more of their Gross domestic product. The majority coffee is produced in developing countries. On the other hand, the majority of coffee is consumed in developed countries.

The thesis “World Production and International Trade in Coffee” was chosen because the international trade in agricultural commodities, especially the coffee, is interesting topic for me, which I would like to dedicate at a professional level in future.

Before the writing of thesis, many questions were appeared here. The questions like: What is the origin of coffee? Who are the biggest producers and consumers? How long does it take to coffee to get from the farm to the customer´s table? And how does the transportation process look like? Who influence the final coffee price which is bought by the consumers in shops or restaurants? How the Fair trade is included in the coffee business? What are the reasons for growing one or the other type of coffee?

The Diploma Thesis is divided into two main parts. The first one describes the necessary background of coffee issue. The second part is focused on own investigation.

The theoretical part as well as the practical one starts at the farmer. The origin of plant, its cultivation, harvesting, processing, roasting and grinding are described in the first chapter. The following chapters tell about the coffee production and also consumption. The last theoretical part describes the world trade. Main exporters and importers are mentioned there as well as the price, followed by the chapter of Coffee crisis and last but not least the chapter about sustainable ways in coffee trade as for example Fair Trade and many other approaches.

The practical part should bring the most recent, important and also interesting information from the coffee business. In this part is worked with creation of a new global coffee chain with the description of all indispensable entities and different levels of processed coffee in

each stage. The future development of coffee as a commodity in international trade generates some key questions. First important question is if the volume of exporting coffee is rising worldwide. The main coffee types, which are traded on futures markets, are Arabica and Robusta. This begs the question, whether the two species begin to compete.

The whole thesis is supplemented by figures, graphs and tables. At the end of work, the results of practical part are compared with the theoretical background and with the results and statements of other authors.

Turkish proverb says "*Coffee should be black as hell, strong as death, and sweet as love.*" In following chapters we will see if this proverb still holds true.

2. Objectives

The primary objective is to create the global coffee chain, to make an analysis of it and to identify all the participants and their roles in the trade. One of the parts of this objective is also to capture the various phases of processed coffee in every step of the chain, to know whether the value of coffee is increased by its processing or by passing from one hand to the other.

The secondary objective is to determine the future status of the world coffee production and international coffee trade. This task is based on two hypotheses. First hypothesis says that the volume of exported coffee is increasing worldwide. Second hypothesis says that the Arabica production decreases at the expense of the Robusta production.

The operational objective of the thesis is to compile the theoretical part in such a way that it could support own research in the practical part. The necessity of this section is to formulate the required background and to understand the context. The aim of this part is to define the term coffee, its production, processing methods and also consumption and get to know how the coffee market works.

3. Methodology

The analysis of global coffee chain is based on critical review of scientific studies and on the information of other interested authors and journalists. It is also based on the comparison of the official documents and annual reports of international organizations.

For the determination of the future status of the world coffee production and international coffee trade are set two hypotheses:

1. The volume of exported coffee is increasing worldwide
2. Arabica production decreases at the expense of Robusta production

The first hypotheses is accepted or refused by using mainly quantitative methods, which contain the analyses of trend function, analyses of time series and the comparison of absolute values of chosen indicators. The arithmetic operations are calculated in MS Excel 2010 program. The chosen period is from 1994 to 2012 and it represents 19 years. The analysis of trend function is used for calculation of prognoses for next three years, 2013, 2014 and 2015. The linear trend function is calculated by formula Y = a + bx and auxiliary formulas a = $\bar{y_i}$ and b = $\frac{\sum yt}{\sum t^2}$. This calculation is verified by the Coefficient of determination, which has to lie in the interval from 0 to 1 and its formula is $R^2 = \frac{S\hat{y}^2}{Sy^2}$ and its auxiliary formulas are $S\hat{y}^2 = \frac{\Sigma(\hat{y}-\bar{y})^2}{n}$ and $Sy^2 = \frac{\Sigma(y_{real}-\bar{y})^2}{n}$.

The second hypotheses is accepted or refused by using mainly qualitative methods, which are based on comparison of scientific studies of nine researchers and analyses of chosen documents with the data expressed in the graphical form on the basis of ascending arranged data from the databases FAOSTAT and USDA.

The theoretical part of the thesis is processed as a literature review based on scientific literature, which is sequentially analysed and the authenticity of the information is verified by comparison of several different expert sources. For the collection of information are used sources as scientific books, databases (FAOSTAT, USDA), websites of international organizations (ICO, FAO, and UNCTAD), websites of other coffee involved companies (Nestlé, Mondeléz

International, Procter and Gamble and D.E Master Blenders 1753) and other documents. Citation of sources is based on recommendations issued for writing citations for FTZ.

4. Background

4.1 Coffee

4.1.1 Evolution and history

According to UNCTAD (2012), the most famous legend about the discovery of coffee is about an Arab shepherd boy, who once saw his goats excited after eating some berries. The boy tasted the berries on himself. He was as excited as his herd and so he decided to take some to the village. When villagers tasted it, they felt that stimulation effect on their own bodies. They could stay awake for long hours. Finally the fruit was signed as a "devil fruit", because of its special properties.

Many historians agree that the coffee originates from Ethiopia and Yemen. Both countries are only ones, where coffee tree grows in a natural environment. According to Normanová (2004), the first coffee plantations exist since 15th century.

There are some doubts about the first traders, who bring the coffee into Europe. It could be, according to Smekalová (2006), Dutch or Italians, according to Normanová (2004), the biggest trading rivals in that time. Venetians helped to bring the coffee beans into Europe, but Dutch introduced this crop to the rest of world as for example to Indonesia, which later became one of the first exporters of coffee beans in the world. They imported coffee plants from India. Then the plants were imported to French colonies, South and Middle America. Then in 1730 the British introduced coffee on the island of Jamaica and after 150 years the coffee went back to the African continent, where they laid in 1880 in Kenya the basics of coffee industry. In the same time the French brought coffee to Vietnam and in 1896, there were the first trees planted in Australia. And by this way, the secret, which was originally protected by Arabians for very long time, became famous throughout the whole world (Augustín, 2000).

4.1.2 Botanical characteristics

The coffee plant is always green shrub, tree or creeper. Its branches are fully length densely leaved. The leaves are evergreen, opposite, dark green, leathery, oval, pointed at the edges and curled. The flowers are white, with five or six petals tubular grown together. The flowers of Arabica are self-pollinating, while Robusta is allogamous. The coffee plant can have

up to 30.000 flowers and usually it bloom after 4 years from planting (Dvořáková, 2004). Flowers bloom all year round, so there can be on the same tree flowers and fruit simultaneously. Its aroma is similar as aroma of jasmine. The fertility period lasts approximately from 20 to 30 years and can be harvested 2 or 3 times per year, in case of Arabica. In case of Robusta, the berries can be harvested usually only once pre year. The berries evolve from 40 per cent of pollinated flowers. The colour of berries changes from green, yellow, red and black, according to their maturation. In the time of harvesting, the berries have dark red colour (Normanová, 2004).

Figure 2 - Shape of furrow (Source: Coffee research, 2012)

The colourful pericarp has two seeds – coffee beans which are allocated by flat sides together and wrapped in parchment cover. The parchment cover is called seed coat. The seeds of Robusta have straight furrow and the seeds of Arabica have the furrow shaped in the word "S". Coffee beans are also called coffee cherries, because their red round shape. According to UNCTAD (2012), the Arabica beans consist of 0.8 - 1.4 per cent of caffeine, on the other hand, Robusta beans consist of 1.7 - 4 per cent of caffeine. Berry maturation period depends on the type of coffee and usually matures 9-14 months after pollination (Dvořáková, 2004). Arabica matures in 6-8 months, Robusta needs 3 months more. This allows to Robusta only one harvest per year. In Columbia and Kenya, where the dry and wet season rotate, are two harvests per year. The harvest time differs according to geographic location. In the areas north from equator is harvest at the end of the year. In the south hemisphere is coffee harvested in spring. The countries situated on the equator can harvest during the whole year. Somewhere is used mechanical harvest but the hand harvesting predominates (Smekalová, 2006). Seeds have sage green, blue-green and sometimes yellow-brown colour and after the roasting they are dark brown, their smell and taste are stronger (Dvořáková, 2004). Each shrub gives annually 2 - 3 pounds of berries, which represents approximately a half pound of processed coffee and 20 per cent less after roasting (Normanová, 2004).

Figure 2 - My coffee plant; front side of a leaf; back side of a leaf (Source: own photos, 2012)

4.1.3 Coffee species

Coffea belongs to Rubiaceae family and it has 60 different species of which 10 are cultivated. The two main varieties are Coffea Arabica and Coffea Robusta. Other grown species, with lower quality, are Coffea Liberica and Coffea Excelsa (UNCTAD, 2012).

4.1.3.1 Arabica

The origin of Coffea Arabica comes from the higher elevations of Ethiopia. It grows in mountains in tropical areas between 700 and 2000 meters above the sea level. It is known as the coffee with the highest quality (Dvořáková, 2004). Since the early 2000s, Arabica account for more than 60 per cent of world production, according to UNCTAD (2012).

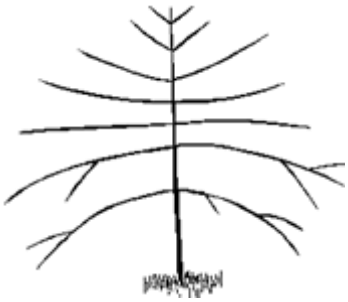


Figure 3 - Arabica plant (Source: UNCTAD, 2012)

Coffea Arabica grows as a tree with one trunk with symmetrical branches. The optimal temperature for the planting is between 17 ° C and 23 ° C.

4.1.3.2 Robusta

Robusta is the main variety of the species Coffea canephora. Smekalová (2006) and Dvořáková (2004) find the origin in the tropical rain forests of the river Congo, west and central Africa. According to UNCTAD (2012), this type represents 40 per cent of world production and it is still growing at the expense of Arabica coffee, through better adaptability, site conditions and resistance to disease. Due to these characteristics it was named "Robusta". The seeds are smaller and less quality than Arabica seeds. There is lower value of taste so that is why it is often used into the mixture of coffees or to preparation espresso or soluble coffee.

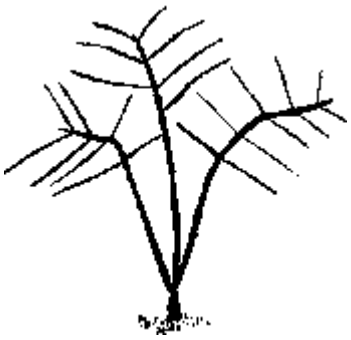


Figure 4 - Robusta plant (Source: UNCTAD, 2012)

Usually, Robusta grows as a shrub, but sometimes it is also possible to see this plant as a tree with more branched stems. It is grown in humid tropical climate in the plains mainly in Africa but also in Vietnam, India, Indonesia, Madagascar, Brazil and the Philippines. It grows faster than Arabica (UNCTAD, 2012).

4.1.3.3 Liberica

The Coffea Liberica is also known as "Coffee of Liberia". The origin of Liberica coffea is in lowland tropical rain forests of West African coast, mainly in Liberia. Its production is negligible, it is involved in 1 per cent of world coffee production. The quality is low with a bitter flavour. As well as Robusta, it is used into the mixtures (Dvořáková, 2004).

4.1.3.4 Excelsa

The Coffea Excelsa, also known as "Coffee of Chad", is a coffee of low quality with sharp distinctive aroma and high caffeine content (Dvořáková, 2004). It is produced in African countries as Chad, Sierra Leone, Central African Republic and Benin and also in Asian countries

as Philippines, Indonesia, Thailand and Vietnam. The production of coffee excelsa is as low as coffee Liberica.

4.1.4 Cultivation of Coffee

Generally, coffee is grown around the equator between the Tropics of Cancer and Capricorn. Coffee Arabica and Coffee Robusta have in some growing conditions different requirements.

Coffee Arabica is grown between 800 and 2000 meters above the sea level, except Ethiopia, where the coffee is grown at about 2800 meters above the sea level. The farther from the equator the more it is possible to grow coffee at a lower altitude. The Robusta can be cultivated in lowlands, up to 900 meters above the sea level. The most suitable temperature for planting is for Arabica between 15°C and 24°C, for Robusta it is between 24°C and 30°C. Both types of coffee require annual rainfalls at least about 1500 - 2000 mm, during the growing and cropping period. In case of dry season it is necessary to use some irrigation system. The most suitable is planting the coffee under the shade of other trees, for example under the banana tree, pine or bamboo. It keeps the moisture in the soil, protects coffee plants from wind and also creates a shield for the leaves from the sun rays. Simultaneously, this method of cultivation ensures biodiversity.

The new plant can be grown from the seed or cutting. Seeds germinate 3-4 weeks. They are usually planted in the nursery until the length size between 30 and 50 cm. Then they are planted at a distance of 3 m from each other at the plantations. The life cycle of coffee can be divided into 3 sections, as a growth, maturity and death. The growth takes up to 7 years, maturity lasts between 20 and 30 years and finishing by the death of plant. The coffee plant can grow to a height of 5 – 8 meters, some even up to 15 meters, it depends on the variety. This height is not required, and therefore the farmers reduce their plants for only about 2 or 3 meters in height from the practical reasons of harvesting. The berries ripen quite long time, approximately between 9 – 14 months (Veselá, 2010).

4.1.5 Harvesting

Harvesting comes after maturation of cherries. According to Veselá (2012), the harvest time depends on geographical location. Coffee is harvested throughout the year in countries around the equator, where the constant climate is. In the countries, which are situated north from the equator, the coffee is harvested usually from September to December. In countries in south from the equator is mainly coffee harvested in April and May. The farmers begin the harvest in lower altitude, because there the coffee matures much faster. Later they are moving to higher altitudes. In the higher locations, the berries mature slower and so they are better in quality. The whole harvest takes about 2 months.

According to FAO (2012), there are four methods of harvesting: stripping, combing, machine collecting and handpicking.

4.1.5.1 Stripping

This method is the most devastating for the coffee shrub, even though it is provided by hands of farmers. During this method is removing all leaves, flowers, ripe cherries, unripe cherries and also over-ripe ones from the branches. The stripping is practised in some regions in Africa and Brazil, despite the fact that produces poor results.

Figure 5 - Stripping of coffee berries (Source: Lavazza, 2012)

4.1.5.2 Combing

This method includes the combing of branches by special flexible comb. It removes all the grains from a branch, but the leaves and flowers are left on the branches. Some collected berries are green and unripe, so therefore is need of sorting. The method is quite fast and cheap, but not friendly to coffee tree. It is used mainly for Robusta harvest in Brazil.

4.1.5.3 Machine collecting

The third method is a mechanical harvesting and it is used only in coffee plantations in Brazil and Australia, situated in lower altitudes, where the equal ground is. The most often used machine for this type of collecting coffee berries is tractor with rotating brushes. This machine goes over the shrubs and plucking all the cherries and leaves. This way of harvesting is faster and cheaper than stripping and combing, but it has much more drastic consequences for plants.

Figure 6 - Tractor with rotating brushes

(Source: Wilsonscoffee, 2012)

Figure 7 - Ripe, unripe, overripe beans

(Source: Wilsonscoffee, 2012)

4.1.5.4 Handpicking

The handpicking is a method of selective collection by hands of farmers one by one and it is used mainly in case of Arabica coffee harvest in Middle and South America, Ethiopia, Kenya, India and many other countries. Only ripe cherries are picked. The picking of cherries can be provided many times in the year. This method is the most expensive method, because it is more consuming in terms of time, manpower and investment. On the other hand it improves the quality of the crop and thereby, the final product. This type of harvest is most friendly to coffee plant as it can be. It will not damage any leaves, flowers or even green berries.

4.1.6 Processing of berries

The coffee berries can be processed by two methods. The first one is a wet method, which is faster but more costly. The second method is dry, the most economic method (Dvořáková, 2004).

4.1.6.1 Wet method

With a large amount of water are completely separated immature and undeveloped berries and dirt from fully matured berries. Therefore the harvest is better in quality. In special machines the fleshy pericarp is removed from the seeds. In the fermentation tanks the fermentation is going from 14 to 24 hours. During the process the seeds ferment and the remains of the pericarp are removed from the fermented seeds. After that the seeds are washed and dried. The peeling machine removes the dry endocarp. Then, the polishing is going to remove the top layer of the seed coat. This kind of prepared seeds are determined by the weight, size and colour within a few degrees of quality. For example the coffee Arabica is divided into groups as mild soft and hard, where the mild means the highest quality. Green coffee is exported and then at the point of consumption is roasted (Dvořáková, 2004).

The wet method keeps the seeds more aromatic. In countries of origin is coffee roasted minimally, because fresh roasted coffee has short time of expiration (Smekalová, 2006). The wet process is done in Latin America and East Africa (Kaplinski, 2004).

4.1.6.2 Dry method

Berries are first washed in water to get rid of dirt. Then they are dried for about a two weeks in the sun with frequent raking. Then they are stored in silos, where they lose the rest of water inside. Dry berries are given into peeling machines to rid of a pericarp and seed coat. Then the seeds are cleaned and sorted. This method has been still the most widespread. It is used wherever there is a water shortage. According to Kaplinski (2004), dry process is used in Brazil and Ethiopia. During this method there are processed all the berries, even these less valuable, so that is why the coffee is lower in quality (Dvořáková, 2004).

4.1.7 Roasting and grinding coffee

4.1.7.1 Roasting

Roasting of coffee is the process, in which the coffee bean changes its chemical structure, its weight is reduced and volume is increased. The process of roasting influences the final taste of coffee. According to Veselá (2010), the most important aspects of roasting green coffee are temperature, air intake, speed of movement of the drum in roaster and roasting time.

There exist three different roasting techniques, according to UNCTAD (2012):

1) Traditional roasting

According to Veselá (2010), first of all, the green dried coffee beans are poured into a funnel of roaster. The beans go to the hot roasting drum which spins all the time of roasting. Drum rotation allows all beans equal roasting. Coffee is heated to 200 - 230°C for about 15 minutes. From the temperature of 160°C, there is going physic-chemical reaction inside the beans. The coffee beans are changing the colour into dark brown. They are losing about one-fifth of its weight while the volume is going to be a twice bigger. Initially, the process is endothermic - absorbing heat, but at around 175 °C it becomes exothermic (Coffee Research Institute, 2012).

Nine minutes after is possible to hear the first rupture, called the "first crack". During the rupturing, the beans increase in size up to two times. The important chemical changes in the beans begin to happen after the first crack. Starches are converted to sugars, which gradually caramelize and acidity subsides. Proteins are decomposed to peptides, and thus the oil can be seen on the surface of grains during longer roasting. In next 5 minutes is heard the second rupture – the "second crack". The roasting should be ended after the "second crack" otherwise the beans will be over-roasted and taste the bitter.

There are 10 degrees of roasting, Light Cinnamon, Cinnamon, New England, American-Light City, City Plus - Medium, Full City, Light French – Viennese, French, Italian and Spanish. The first three stages represent the coffee with fairly strong sour taste. The flavor of coffee of next four stages is sweet and chocolate. The last three stages of roasting bring the stronger bitter taste of coffee.

In the northern countries is coffee usually roasted until the first rupture. Italian, Spanish and also Czech roast the coffee until the point of second rupture.

Generally there exist two types or roasting machines, drum and hot-air. Drum roasting machines are used in Europe, hot-air machines are preferred in America.

The process is finishing by cooling. The roasted beans are moved into special circular tank where they are rapidly cooled to stop all the chemical processes. Then the coffee is allowed to rest for about two days, and may be packaged.

2) Fast roasting

   This process takes only about 10 minutes. The coffee beans are roasted by 600°C. This process is used in case of big volume of coffee needed to be roasted.

3) “Flash” roasting

   This process is the shortest one, because it takes only 1 minute and 30 seconds. It is used mainly for making instant coffee from Robusta.

According to Unctad 2013, from 88 per cent, the coffee is roasted in importing countries.

4.1.7.2 Grinding

The coffee is grinding usually in importing countries, because it is used into mixtures of several different coffees, or even in cafés or restaurants. The reason is because of its flavour, which weakens over time.

4.1.8 Utilization of Coffee

The coffee is used mainly as a beverage. The coffee extract is often used as a flavour of pastries, candies or alcohols. Nowadays it is broadly used in cosmetic and pharmaceutical industry as an ingredient in creams and other healthy products. Due to caffeine which is contained inside is promising younger 'fresher' look. There are some experiments with the feasibility of using low quality coffees as an alternative fuel in Central America – Guatemala, Mexico and Costa Rica.

The coffee as a beverage is used the roast and ground coffee, soluble coffee, decaffeinated coffee, organic coffee, fair trade coffee and many others.

4.1.8.1 Soluble coffee

The first instant coffee was developed in 1901 in Chicago . In 1938 it was introduced in the market by company called Nescafe (UNCTAD, 2013). The first use of soluble coffee was noticed from the 2nd world war, when soldiers used it for its fast preparation. This coffee is often made from Robusta (Normanová, 2004). The instant coffee is prepared from coffee extract, which is processed by two types of dehydration, dehydration in hot or dehydration in cold. Hot dehydration is made by 200°C, the result of it is small granules of dried coffee. The cold and also called freeze dehydration is made by –40°C, when the coffee grains are crushed into small flakes and then by freeze are dried.

4.1.8.2 Decaffeinated coffee

Decaffeinated coffee is a coffee where a portion of caffeine in the grains is removed while the aroma and flavour are maintained. The process is done while grains are still green, it means before their roasting. The first decaffeination was conducted by German chemist in 1819. According the European legislation, the caffeine in a cup of decaffeinated coffee cannot exceed the limit of 0.01 per cent in green coffee beans and 0.03 per cent in coffee extracts. The Arabica and Robusta contain different levels of caffeine. The Arabica includes 0.8-1.4 per cent of caffeine, the Robusta has the content of caffeine higher, between 1.7 and 4 per cent.

Three main decaffeination processes are: 1) Traditional or European process

2) Water or Switzerland process

3) Process CO2/eau or water spray

During the traditional process, the coffee is soaked into the bath with trichlor-ethylene or methylene chloride. The second, water process, is quite expensive but the most environmental friendly, when the coffee is soaked into the water bath.

4.1.9 Natural threats

According to UNCTAD, coffee can be damage by more than 900 species of fungi, viruses and animals. The Arabica coffee is much more sensitive than Robusta coffee and it is the

most often threaten by coffee rust, evil of the canvas, nematodes or nematodes that attack the roots of the shrub and the coffee berry borer.

The most harmful disease of Arabica is the coffee rust, which is created by fungus. This fungus occurs under wet conditions and the temperature between 15 and 30 ° C. During the rains and hot it can grow only in one or two days. The main indicator of this disease is the appearance of orange spots on the leaves. The coffee rust causes lower number of flowers and cherries as well. Usually it results in harvest loss of from 20 to 70 per cent in critical cases.

4.2 Coffee production

Majority of world coffee production comes from fifty states. In 1852, it has been produced less than 5 million of bags per year, nowadays, after the century and half the production increases into more than 130 million bags of coffee per year. Around 90 million bags are exported. Coffee production rises very fast, today the rising of production is even two times faster than market demand (UNCTAD, 2013).

4.2.1 The largest regions and their performance

The largest producer of coffee is Brazil, at the second stage of the scale enters Vietnam and the third stage belongs to Colombia. These three countries represent more than half of worldwide production. According to UNCTAD (2013) Brazil, Vietnam and Colombia cultivated more than 70 million of bags in 2011. The fourth coffee producer is Indonesia and the fifth is India. The coffee production is not considered to be a tradition, for example in case of Vietnam, where coffee growing comes mainly from governmental reasons such as strengthening the country's economy.

4.2.1.1 Brazil

Brazil is the largest supplier of this commodity in the world. It´s production is about 44 million bags per crop year. From that the domestic consumption includes approximately 20 million bags a crop year, ICO (2013). In 2011, Brazil exported 30 million of 60-kg bags of green coffee, from that 27 million of green Arabica and 3 million of green Robusta. It also exported processed coffee in amount of 3.4 million of 60-kg bags.

4.2.1.2 Vietnam

Vietnam is the largest producer of Robusta, but also produces some Arabica coffee. It is the second largest producer of coffee in the world. The share of Asian region in world coffee production has increased in years 1995-2012. According to UNCTAD (2013), in 1995 the volume of production in Asia were almost 13 million of bags, in 2002 it was almost 34 million. This enormous growth is caused mainly by Vietnam that produced 4 million bags of coffee in 1995 and today, it can produce more than 24 million bags per crop year, ICO (2013). This is an incredible six times increase in 17 years. Since 1995 Vietnam became one of the largest world's market player in coffee production sector. About 15 per cent of world production goes from Vietnam. The domestic consumption represents approximately 1.5 million bags per crop year. Majority of its consumption is exported. Vietnam exported more than 17 million of 60-kg bags of green coffee and more than 28 thousands of 60-kg bags of processed coffee.

4.2.1.3 Colombia

Colombia is the third largest producer of coffee in the world. It specializes mainly in production of Arabica coffee. About 7 per cent of world production goes from this country. It´s production is 7.6 million and it´s consumption is 1.4 million of bags per crop year. In 2011 Colombia exported more than 7 million of 60-kg bags of green coffee and more than 600 thousands of 60-kg bags of processed coffee.

4.2.1.4 Supply

There are two main factors affecting the supply, according to UNCTAD (2013).
The first one is the fact that the volume of coffee production is uncertain. Coffee is a crop that follows a biennial cycle, which means that amount of yield in one year, is quite different from amount of the second year. Coffee yield is usually high in the first half of biennial cycle, in the second half of cycle is yield generally lower. The rich half is called on-year and the poor one is called off-year. From this reason the production cannot follow the prices in the short term. The supply also depends on the disease throughout the plantation or weather conditions such as frost, which can be the causes of poor harvest.
The second factor is that the coffee is characterized by its low elasticity of supply. The producers cannot react to offer from international markets in the short term, the period less than two years. The World Bank estimates that the coffee elasticity in the short term is 0.04, which means a very low. In the long term is elasticity quite higher, it is 0.4.

4.3 Coffee consumption

According to ICO, global consumption in coffee year 2009/2010 accounted around 133.9 million bags, of which 93.2 million bags were consumed in importing countries and 40.7 million in producing countries. Since 1980, coffee consumption has been increasing in 1.2-2 per cent per year. The fastest consumption can be seen in Japan in recent years. The consumption growth reached up to 3.5 per cent a year. In 2011, the total world consumption of coffee reached 137 million 900 thousand bags (ICO, 2012).

Consumption is influenced by many factors. The amount of consumed coffee is affected by size and structure of the population, income per capita, relative prices, changes in consumer buying behaviour and its substitute products such as tea and cocoa (UNCTAD, 2013).

Consumption is usually reported in two parameters. The first one is Average annual consumption and the second is Per capita consumption. These values very often differ as it can be seen in the following paragraphs.

4.3.1 Average annual consumption

Average annual consumption is a share of total amount consumed. In 2011, the first place in consumption belonged to U.S. There was about 22 million of 60kg-bags consumed per a year. In the same year, Brazil consumed about 19 million and half of bags. The third most consumed country was Germany with more than 9 million bags. About two million less consumed Japanese and they captured the fourth position. France, Italy, Russia and Canada rise just behind Japan (ICO, 2011).

4.3.2 Per capita consumption

Per capita consumption reflects the average annual weight of coffee in kilograms, which is consumed by each person in a country. According to ICO (2012), the largest coffee drinkers come from Finland with the average consumption of 11.7 kg per year. It is almost three times bigger consumer than the U.S. are. The second place belongs to Norway with 9.4 kg of coffee consumed per person and year. Norwegians drink in average about 6 cups of coffee per person every month. The next are, the Danish with 8.9 kg and the Swedes with 8.1 kg. At the 5th and

6th place of an imaginary ladder were placed to Switzerland and Germany, with 7.4 kg and 6.8 kg of consumed coffee. The Chartsbin (2011) noted also the inhabitants of Iceland with 9kg, which was not included into ICO scale in 2012. Iceland is also known for consuming an abundant amount of sugar. Whereas there can be seen a link with a coffee drinking. For example, in 2011, the US citizens consumed 4.2 kg per head and they were the 25th biggest consumer of coffee. Czechs have drunk 4 kg per person in that time. The survey shows that the most coffee drinkers are from the north of Europe.

4.3.3 Demand

Coffee is one of the commodities that are used by people on a daily basis and therefore the demand for coffee is price inelastic (Čermák, 2008). When coffee prices rise, people do not reduce their coffee consumption and when coffee prices fall, consumers do not increase coffee drinking.

According to ICO (2011) in 2010, the global demand for coffee rose by 2.4 per cent to a record 134 million of 60 kg bags. It is estimated that in the next ten years, the trend of increasing demand for coffee will continue, in average of 2.5 per cent per year. According to ČTK (2011), China mainly affects an increase of coffee consumption. Its economy is growing and hence the lifestyle is getting faster, to which undoubtedly belongs a cup of coffee. Nowadays, coffee is drunk mainly in cafes in China, but sales of coffee machines for homes, begins to grow. By 2015, the company International Coffee Strabucks plans to expand the number of cafes in China or around 1500. Demand continues to grow in India, but there a quality coffee was replaced by a cheaper one. In Germany, the demand of coffee is still the same, relatively high. According to E15 (2012), demand in Europe begins to stagnate and so traders are beginning to focus mainly on Asia, despite the fact that today Chinese consume just half a cup per person and year. Coffee experts predict boom in Asia.

4.4 World Trade in Coffee

4.4.1 Coffee - a trade commodity

Coffee is an important agricultural commodity in the world economy. According to ICO (2013), it is the largest traded agricultural commodity in the world. Trading coffee is big business in major coffee producing countries like Brazil, Columbia, Vietnam and many others. Coffee trade is divided into Arabica and Robusta markets. The producers and consumers can be divided almost according to five continents, while American continent is separated and belongs to both groups. The main producers come from continents like South America, Asia and Africa. The rest continents like North America (U.S. and Canada), Europe and Australia are mainly consuming. International Coffee Organisation (ICO) is the umbrella body for coffee traders, importers and exporters.

The governments of exporting countries have to react on every unexpected problems associated with coffee, as a coffee crises. They have to support more their coffee growers. The exchange rate of currencies, mainly the U.S. dollar, also affects the international coffee trade. For example the appreciation of U.S. dollar can increase the competitiveness and also income in some countries. On other hand, it can also enhance the input costs.

The biennial cycle of Arabica plays also a big role in the international trade. The crop year 2010 was weaker in production. According to expecting high production in next year, the movements on coffee market were considerable influenced.

Mr. Johnston says that coffee is a soft commodity, because its position in the market can be changed in a moment. According to him, trading coffee is not for people with soft natures.

4.4.2 Export

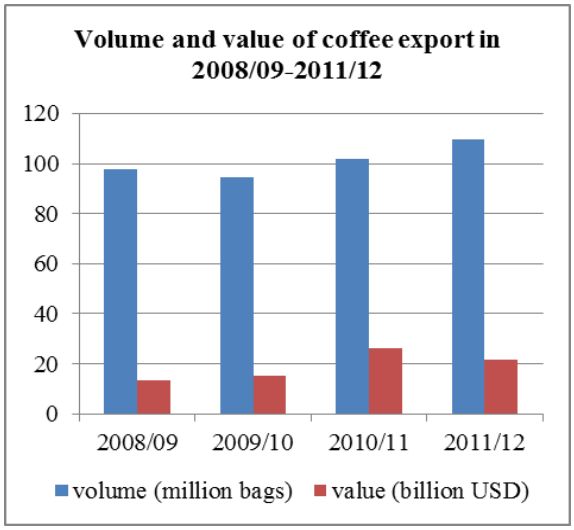
The International Coffee Organization includes exporting and importing countries. Its members represent 97 per cent of world production and over 80 per cent of world consumption. The main exporting countries, according to Faostat (2010), are Brazil, Colombia, Vietnam, Germany, Peru and Indonesia. Then there are smaller exporting countries for which the coffee export is crucial, like Burundi, Ethiopia, Rwanda, Honduras and Uganda. In 2009/2010, Burundi share of coffee export from its total export was 59 per cent, so the coffee is key cash crop there and also in many other developing countries. In the same year, in Ethiopia, the share of coffee export was 33 per cent from the total one. 27 per cent of total Rwanda export belonged to coffee

export as well. According to Drakoln (2013), coffee accounts for 60 per cent of Ethiopia's exports now. It is believed that more than 100 million people in these countries depend on coffee as their primary source of income.

According to ICO (2012), in crop year 2011/2012, the total export reached 109.4 million bags in value US$21.6 billion. In 2010/2011, the total export was lower than in last season, it accounted 104.7 million of bags. There can be seen 4.5 per cent increase in amount, but the price went down. In 2010/2011 were exported 104.7 million of bags while the price was US$23.6 billion. The value of export in 2011/2012 was decreased in 8.3 per cent in comparison to the last year. Robusta´s exports also increased from 37 to 43.1 million bags in 2011/2012. Arabica´s exports a bit decreased from 67.8 million bags in 2010/2011 to 66.3 million bags in 2011/2012.

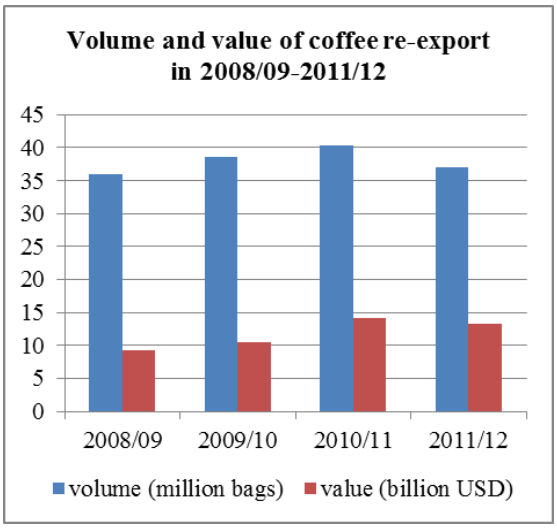
Graph 1 - Coffee export

(Source of data: own creation based on ICO, 2012)



Graph 2 - Coffee re-export

(Source of data: own creation based on ICO, 2012)



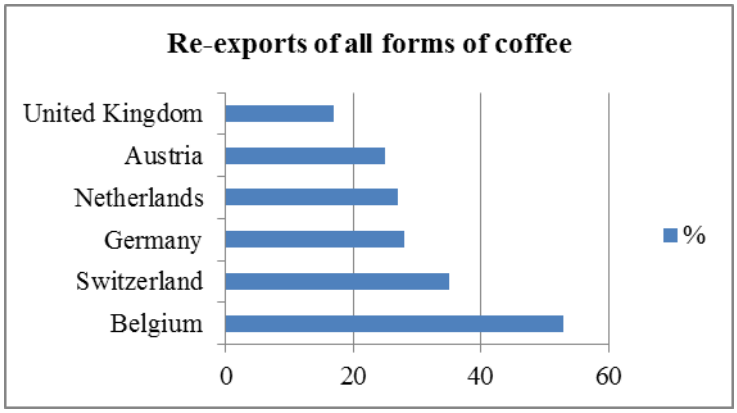
4.4.2.1 Re-exports

The volume of re-exports by importing countries was 37 million bags for the total value of US$13.3 billion, in crop year 2011/2012. According to ICO (2012), in the same year, the re-exports of green coffee fell down by almost 10 per cent. On the other hand, Instant coffee re-exports increased in 19 per cent and roasted coffee re-exports increased in 4 per cent.

Importing countries with significant amount of re-exports were Belgium, Switzerland, Germany, Netherlands and Austria, in 2012. Belgium re-exported about 53 per cent from its total coffee imports. Switzerland re-exported almost 35 per cent of its coffee import. Germany and

Netherlands re-exported almost 30 per cent and Austria re-exported about 25 per cent of its coffee imports.

Graph 3 - Re-exporters in 2012 (Source of data: own creation based on ICO, 2012)



4.4.3 Import and import policies

The biggest importing countries are the European Union, United States of America, Norway and Switzerland. According to ICO (2013), in 2012, the total amount of all forms of imported coffee was 109.6 million bags, from which the European Union imported more than 72 million of bags and the United States more than 26 million bags. In 2011, the totally amount of imported coffee was 107.7 million bags. It follows that import is increasing.

The biggest importer of Europe is surely Germany with its 21.9 million of bags in 2012. The second after Germany is Italy, which imported almost 8.7 million bags. Next big importer is Japan. It imported 6.9 million bags in 2012. For example, Czech Republic imported 1.1 million of coffee bags, but it still belongs to group of bigger importers.

4.4.3.1 EU import policy

The European Union is a member of the International Coffee Organization. It also signed the International Coffee Agreement. According to ICA (2007), there are set of regulations, which must be complied. Through compliance with these rules is supported the worldwide sustainable development of coffee and protected the interests of producers and also consumers. The trade barriers, as preferential tariffs, quotas and government monopolies of EU member states are eliminated. By this way is supported the economic development of coffee-exporting countries. If some member country does not remove the trade barriers, it will probably be punished by EU by political of financial penalties. The consumer rights are also protecting. Each marketed product

under the name “coffee” must contain at least 95 per cent of coffee. The controls are periodically audited by officials of EU. All coffee imported into EU have to have a label of origin. This identification helps in transparency of whole coffee chain. The imported coffee also can not contain some contaminants. There are also set the maximum limits for content of pesticides residuals (EC, 2012).

4.4.3.2 U.S. import policy

The United States are the importing member of the International Coffee Organization. In view of this fact, the same rules are applied for the U.S. as for the EU. But, there also exist an organisation, which all coffee products in the area of United States. Its name is the Food and Drug Administration (FAD). It controls the potential harmful ingredients in coffee. Subsequently, this organization issues approval or warning against consumption of relevant coffee product. FDA controls also all imported coffee into the country. Few bags in every coffee consignment are physically examined. The FDA workers control the potential occurrence of insect, excrements, or other harmful substances (CBP, 2012).

4.4.4 The International Coffee Organization

The ICO is the main intergovernmental organization for coffee. It was established in 1963 in London under the auspices of the United Nations after the signature of the first International Coffee Agreement (ICA). It connects exporting and importing countries to cooperate in coffee sector on international level. Its members represents 97 per cent of world coffee production and 80 per cent of world coffee consumption. The main goals are to improve world coffee economy, to achieve price stability, to improve quality, to develop sustainable coffee market and to fight against the poverty.

The latest coffee agreement is from 2007 and it is the seventh agreement since beginning of ICO. Nowadays, it has 44 members. The importing countries include the EU27, Norway, Switzerland, Tunisia, Turkey and United States of America. The exporting countries are Angola, Bolivia, Brazil, Burundi, Cameroon, Central African Republic, Colombia, Costa Rica, Côte d'Ivoire, Cuba, Ecuador, El Salvador, Ethiopia, Gabon, Ghana, Guatemala, Honduras, India, Indonesia, Kenya, Liberia, Malawi, Mexico, Nicaragua, Panama, Papua New Guinea, Philippines, Rwanda, Sierra Leone, Tanzania, Thailand, Timor-Leste, Togo, Uganda, Vietnam, Yemen, Zambia and Zimbabwe.

4.4.5 The big four corporations

The current market of processed coffee is mainly controlled by four coffee companies. These companies are Nestlé, Procter & Gamble, Mondelēz International (formerly Kraft Foods) and Sara Lee, which was divided in two companies, Hillshire Brands and D.E Master Blenders 1753, in 2012.

These companies produce the major coffee brands like Maxwell House, Folgers, Nescafe and Douwe Egberts. In 2013, Nestlé instant coffee is celebrating its 75th anniversary. It is considered to be the one of the world´s most favourite drinks. Nowadays, 5,500 cups of Nescafé instant coffee are consumed every second in the world.

4.4.5.1 Nestlé

The Nestlé is the world's leading nutrition, health and wellness company. It has more than 140-year history. In 1866, first European condensed milk factory was opened in Switzerland by Anglo-Swiss Condensed Milk Company. In one year after, Mr. Henry Nestlé, who was German pharmacist, developed special infant milk, which was a combination of cow´s milk, wheat flour and sugar. This type of milk should have feed and save many children, who could not be feed by the breast milk. He wanted to solve the problem of infant mortality due to insufficient nutrition (Nestlé, 2013).

According to Mrs. Sekularac (2012), Nestlé had 22.8 per cent of the global coffee market, in July 2012. It is the largest coffee company in the world. The main coffee brand is Nescafé. In 2012, its sales reached the value of 92.2 billion and a trading operating profit was 14 billion.

Figure 8 - Main Nestlé brands (Source: Nestlé, 2013)

4.4.5.2 Procter and Gamble Company

Procter and Gamble is the multinational consumers goods company with headquarter in USA. It was founded in 1837 by William Procter and James Gamble, who worked as a candle-maker and a soap-maker. The company is focused on production of food, beverage, pet food and drugstore goods. Its sales reached $83.7 billion dollars, in 2012. Its products are made in more than 80 countries and they are sold in more than 180 countries. According to Forbes magazine (2012), about 129 thousand of people work for the company. Procter & Gamble products are available in North America, Latin America, Europe, the Middle East, Africa, Asia, Australia and New Zealand (PG, 2013).

The main coffee brands are Folgers and Millstone coffee. The Folgers coffee was gained by Procter and Gamble in 1963 and it became America´s number-one coffee brand (Folgerscoffee, 2013). The Millstone coffee was sold to P&G in 1996 (Millstone, 2013).

Figure 9 - P&G coffee brands (Sources: Folgerscoffee 2013; Millstone, 2013)

4.4.5.3 Mondelēz International (formerly Kraft Foods)

The Mondelēz International is one of the world's largest snacks companies, with global net revenues of $35 billion in 2012. It is a maker of chocolate, cookies, crackers, gum, candy, coffee and powdered beverages. On October 1, 2012, the Kraft Foods changed its name to Mondelēz International. According to Mrs. Sekularac (2012), the Kraft Foods was the second largest company in the world and it had 12.9 per cent of the global coffee market, in July 2012. The company employs about 110.000 employees. Its products are sold to consumers in 165 countries. About 39 per cent from total sales are made in Europe. In case of coffee, they offer many different types of coffee as single service capsules, whole bean coffee, soluble coffees and ground roast coffee (Mondelēz International, 2013).

Figure 10 - Mondelēz brand portfolio (Source: Mondelēz International, 2013)

The Carte Noir is the main brand of coffee which is used in France. In Germany, the most popular coffee is Jacobs. The Gevalia is the most popular brand of coffee in Sweden. In United Kingdom, there is the most drinkable coffee, the Kenco. The Kenco coffee is made from 100 per cent Rainforest Alliance Certified coffee beans. Since 2003, the Kraft Foods Company has been working with The Rainforest Alliance. Since 1993, they have helped develop coffee sustainability and reduced its impact on the environment. The company developed eco-refill packaging and also recycle its Tassimo T-Disc. From this recyclable waste is made re-usable bags and umbrellas (Kraft Foods, 2013).

On the other hand, since 2010, a large number of lawsuits were registered against Kraft Foods. There are many cases noted when the company marked the healthy products for those that actually contain unhealthy fats, or other harmful substances.

Figure 11 - Coffee brands (Source: Kraft Foods, 2013)

4.4.5.4 D.E Master Blenders 1753 (formerly Sara Lee)

The Sara Lee Corporation was one of the biggest consumer-goods companies in the world. It operated in more than 40 countries and sold food, beverage and household products in about 180 countries. On July 4, 2012, it was split into two companies, Hillshire Brands and D.E Master Blenders 1753. The Hillshire Brands operates in North America. D.E Master Blenders 1753 was found in Netherlands and it operates in international beverage and bakery business. Since that time, the name Sara Lee has continued under the Hillshire Brands and is used mainly for bakery products.

D.E Master Blenders 1753 contains over 30 coffee and tea brands in more than 45 countries. The main coffee brands are Douwe Egberts and Piazza d'Oro. The main tea brands are Pickwick and Zlatý šálek (in Czech Republic).

Figure 12 - Main D.E Master Blenders 1753 coffee and tea brands (Source: DE Master Blenders 1753, 2013)

It is the third largest coffee company (after Nestlé and Kraft Foods) in the world and it purchases 8 million bags of green coffee a year. According to Mrs. Sekularac (2012), D.E Master Blenders had 5.9 per cent of the global coffee market.

4.4.6 Price of the coffee commodity

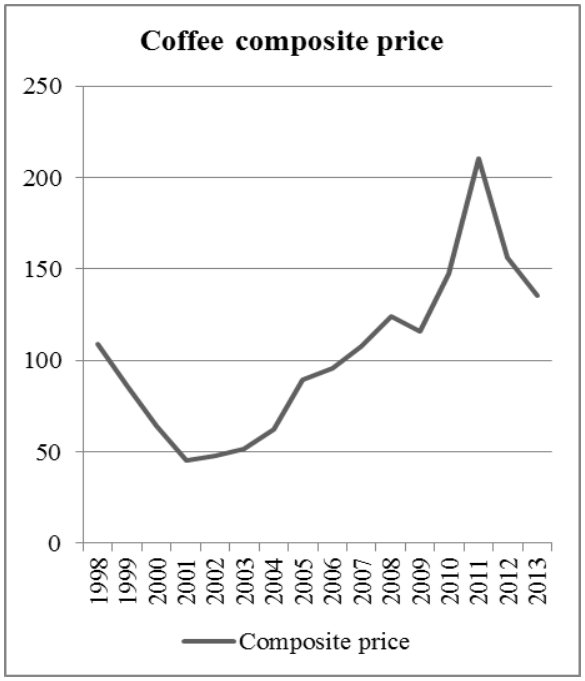
From historic point of view, the coffee price was always considered as the most volatile of commodity prices. Prices have been decreasing since the middle of 90th, when the peak was reached in 2001. According to Mr. Osorio (2002) from ICO, in 1980 the pound of the standard coffee cost US $ 1.20. In 2003 it cost 50 cents. Now, at the beginning of 2013, price fluctuates between US $ 1 and US $ 1.6, while the lower level is for Robusta coffee and higher level of the price is for Arabica coffee, ICO (2013).

According to Drakoln (2013), there are many factors, which influence the coffee price. Price of expensive Brazilian Arabica coffee is influenced by the increase of large amounts of cheap coffee Robusta, mainly from Vietnam. Arabica is pushed to a price war. The price is also affected by so-called the Big Four, who control the Robusta coffee world. These companies buy more than 50 per cent of the world Robusta. The reason why the Big Four buy so much Robusta is its price. According to the indicated sources, the price of Robusta is up to three quarters less than the price of Arabica. The weather or climate also affect coffee price much. According to UNCTAD (2012), there can be seen some cases in history as a drought in Brazil in 1977 or frost in Brazil in 1994. The impact of "El Niño" on South America´s and Asia´s coffee price is considerable. This phenomenon occurs every four years and leads to a decline in the harvest.

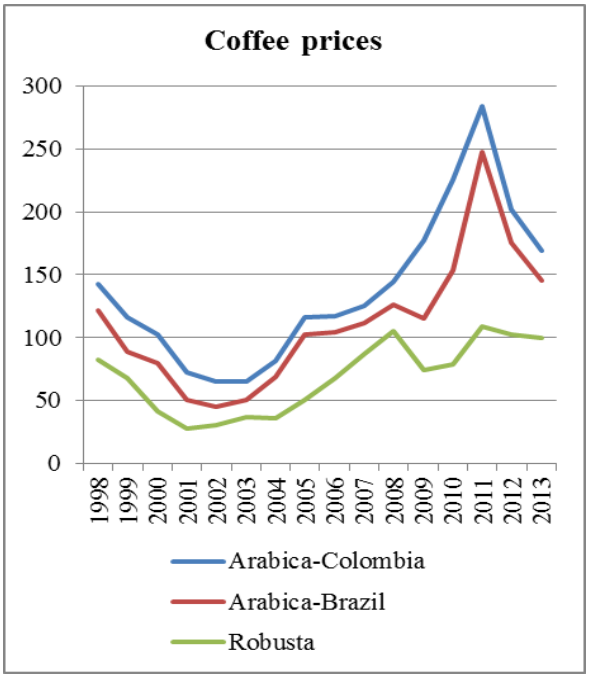
In the following graphs, there can be seen the coffee price development in the period 1998 to 2013. The left graph describes the composite price and the right one shows more or less

visible differences in the prices of three species of coffee. Both graphs show the peak of coffee crises in 2001 and the highest price in 2011.

Graph 4 - Composite coffee price (Source of data: own graph based on data from ICO, 2013)



Graph 5 – Separate coffee prices (Source of data: own graph based on data from ICO, 2013)



4.4.6.1 Futures Markets

Even though the coffee trading is not easy and its position in the market may change in a moment, coffee is one of the most traded commodities in the world. Like other commodities, coffee can be traded in two ways, by physically bought or sold on the spot market, or traded on international futures markets.

The futures market, also called futures exchange, is a central marketplace where futures contracts and options on futures contracts are traded (Investopedia, 2013). The first future exchange was founded in Japan in early 18th century. It was followed by U.S. Chicago Mercantile Exchange, in early 19th century, which was the largest one in all over the world, in that time. Coffee futures are contracts, which are standardised and exchange traded. In such a contract, the buyer agrees to take delivery from the seller, which is a specific quantity of coffee at a predetermined price on a future delivery date. Futures markets are the important tool in the operation of the global financial system.

According to UNCTAD (2012), in terms of volume, there are two main exchanges for coffee futures and options. The first one is called NYSE LIFFE London and Robusta prices are set there. The second one is called the New York Inter Continental Exchange (ICE). The coffee C (so called Arabica coffee) is traded there. The other exchanges, mainly operating on the regional level are New York Mercantile Exchange (NYMEX) and Tokyo Grain Exchange (TGE). Both, Arabica and Robusta are traded at NYMEX, in dollars per pound. Arabica coffee is contracted at Tokyo Grain Exchange in yen per bag and Robusta is also traded there, in yen per kilogram (Options Guide, 2013).

NYSE LIFFE London

NYSE LIFFE London is a leading global operator of financial markets and a provider of innovative trading technologies. It offers derivatives on commodities, bonds, interest rates and other financial means. Its commodity futures and options contracts include cocoa, Robusta coffee, and white sugar, feed wheat, milling wheat, rapeseed, corn and skimmed milk powder. Robusta coffee is traded under the trading code RC, in US dollars per tonne at NYSE LIFFE London market (NYX, 2013).

Inter-Continental Exchange (ICE)

The Inter-Continental Exchange creates the background for agricultural, currency, emissions, energy and other markets. There is traded with world´s most traded commodities, as crude oil, sugar, cotton and foreign exchange. The coffee is trading under the symbol KC. The coffee C stands for Arabica coffee. The price is paid for physical delivery of coffee beans from one of 19 countries to one of U.S. or Europe ports. For example, Mexico, Kenya, Peru, India and Brazil are the countries, from where is coffee delivered to ports in New York, Hamburg, Miami or Barcelona. The contracts are priced in cents and hundredths of a cent (ICE, 2013).

4.4.6.2 Price paid to producers

As it was said, coffee prices are very volatile at coffee market, so the prices which go back to producers are the same. Generally speaking, if the prices in international market grow, then the producer´s prices in exporting countries will increase as well. Usually, producers are paid less than half of the actual market value when they sell their coffee to the intermediaries or export houses. There is a case from Honduras, the coffee was traded on ICE (formerly NYBOT) for $1.40 per pound, but the producers got only $0.65 per pound. According to Fairtrade (2012),

nowadays, the coffee growers receive 7-10 per cent of the retail price of coffee in supermarkets in comparison with 1970th when the coffee producers received about 20 per cent of the coffee sold at the retail market. During the coffee crises the situation was even worse. Farmers earned only between 1 to 3 per cent from the coffee sold in café and between 2 to 6 per cent from the coffee sold in supermarket. From that reason, the fair trade approach is needed very much. Fair trade set the minimum fair trade price, which in case of washed Arabica it is 140 cents per pound and in case of Robusta it is 101 cents. Fair trade also set the fair trade premium, added 20 cents more.

4.4.7 Coffee crisis

4.4.7.1 Background

The coffee prices have been controlled by a cartel until 1989. This worked similarly like OPEC for oil. The International Coffee Agreement (ICA) imposed quotas and controlled prices between major coffee producing and consuming countries. The prices were settled on so called "sustainable level". They were quite stable. These prices were well known as the "C" prices on the commodity market and kept the level of between US$1 and $1.50 a pound (Osorio, 2002). This level should ensure enough money for farmers and cooperatives, it covered farmer´s costs and also it allowed them to earn something more (Prince, 2002).

Since 1989, when the cartel collapsed, started the coffee prices going down. The most horrible year for coffee was the year 2001, when one pound of coffee cost US$45 cents (Osorio, 2002).

4.4.7.2 Reasons

There can be found many reasons, why the cartel collapsed in 1989. But, all the researchers and workers agree that the main blame bear "The Big Four". The Big Four is a designation for multinational corporations, which play a large role in increasing of coffee supply. These four large companies are in coffee business well-known names. They are Nestlé, Proctor and Gamble, Kraft, and Sara Lee. They made enormous profits mainly by lowering the quality of the world's coffee.

The main reason of coffee crisis is sustained low coffee prices, which come from oversupply of coffee. This great amount of coffee has been generated by increasing production of coffee in developing countries as a tool of the World development Bank for poverty reduction. One of the most supported countries is just Vietnam and according to Mr. Osorio (2002) and Indonesia. The World Bank, the Vietnamese government and also the Big Four are the main movers of coffee production in this poor country. These organizations are criticised by Mr. Prince (2002) and others, who say that nobody cares about quality, but everybody cares about high yields and also profits. In 10 years, in 2000, Vietnam reached almost same level (1 million tons) of production as Brazil had in 1990 (1.4 million tons). According to ICO, this country increased production over 1100 per cent in the decade beginning in 1991. There is very low sea level, so that is why there is planting only Robusta. According to Mr. Prince, the author of the critical review from coffeegeek.com, Vietnam is capable to produce only very low quality Robusta. He also says that the Big Four planned to use special technologies there for a long time before. It is believed, that the Big Four had a plan how to find suitable country with low planting and processing costs and subsequently to develop the technologies how to improve this so low quality coffee. Their processing methods could make the coffee less bitter, more tasty and without unpleasant smell. According to an article from coffee habitat website, the corporations started to sell instant Robusta with artificial colours and flavour as hazelnut, vanilla or even with Irish cream. So, these big producers buy moreover Robusta than high quality Arabica from Colombia and Central America, where the production costs are much higher than they are in Vietnam. And so there is also a reduction in prices of Arabica, which negatively influenced global coffee market.

Other reason, according to ICO, may be due to a lack of support by the U.S. The president Reagan argued for free trade. Under the free market, prices plummeted down to $0.49 per pound in 1992. This price is a commodity price and the farmer will receive only a fraction of this price, which is so far from at least coverage of their costs.

4.4.7.3 Effects

Because of the low prices, farmers reduce care about coffee plantation and they do not plant new plants or they are forced to produce something else. For example the Ethiopian people started to grow “false banana”, which look like real banana, but it has no vitamins and proteins, so they are dying for malnutrition. Some starts to produce drugs. In Middle America people are giving up working in coffee plantations and they are moving into cities. In South America is a

change the coffee production to production of cocaine and opium. The Big Four say that they want to help people by such a price that everyone could effort coffee, but in reality, they harm farmers, customers and also coffee itself. Good quality coffee is being replaced by low quality one. It is expecting there will be shortage of any quality coffee and soon the Big Four will pay $3 per pound for the worst coffee from Vietnam (Prince, 2002). Nicholas Stein (2002), reporter of Fortune magazine, opinion is:" Short-term economic advantages of Robusta are overshadowed by long-term costs — for growers, drinkers, even the Big Four themselves."

4.4.7.4 Solutions

Because there can be seen some threats in coffee sustainable development, International Coffee Organization ratified the International Coffee Agreement in 2001 to prevent imbalance between supply and demand in coffee market. The aims of this pact were to help stabilize coffee prices, to support its members in sustainable coffee development, to reduce poverty. The ICO want to improve a quality on the supply side. In 2002, ICO settled the norm for maximum content of moisture in exported bags. Other measures include the diversification of farmer's risk. Farmers are too dependent on coffee as an only one source of income. The ICO would like to support them also in alternative ways of income. On the supply side, there is also very important the control in production programs of member countries. The programs which leaded to imbalance would be excluded. The ICO wants to focus on promotion and trade barriers, on the demand side. The sales promotion will be used in current and also new markets, as China and Russia. ICO strives for the elimination of tariffs on agricultural products from developing countries.

4.4.8 Sustainable approaches in coffee trade

Sustainable coffee is a coffee, which is planted and traded for its sustainability. United Nations Conference on Trade and Development (UNCTAD) and International Institute for Sustainable Development (IISD) created The Sustainable Commodity Initiative (SCI) in 2003 (SCI, 2013). SCI covers almost 90 representatives from coffee production, trade and labelling organizations (Agritrade, 2004). The aim of this initiative is to ensure sustainable production and trade with while social, economic and environmental welfare is secured.

Economic sustainability in coffee trade has to be ensured to avoid next coffee crises as the peak of it was in 2001. Oversupply and low prices of coffee can never be reached again,

because the decline in prices leads in low household revenues, which involve the social background. Farmers cannot afford the basic education, health care even food for their families. There must be supported traditional coffee farming, as growing coffee in shadow of trees, which has lower level of impact on environment. On the other side, cutting down forests for the cultivated coffee in the sun should be at least limited (UNCTAD, IISD, 2003).

The four largest certification initiatives with deep impact on coffee trade are Fair Trade, Organic, Rainforest Alliance and Bird Friendly.

4.4.8.1 Fairtrade certified

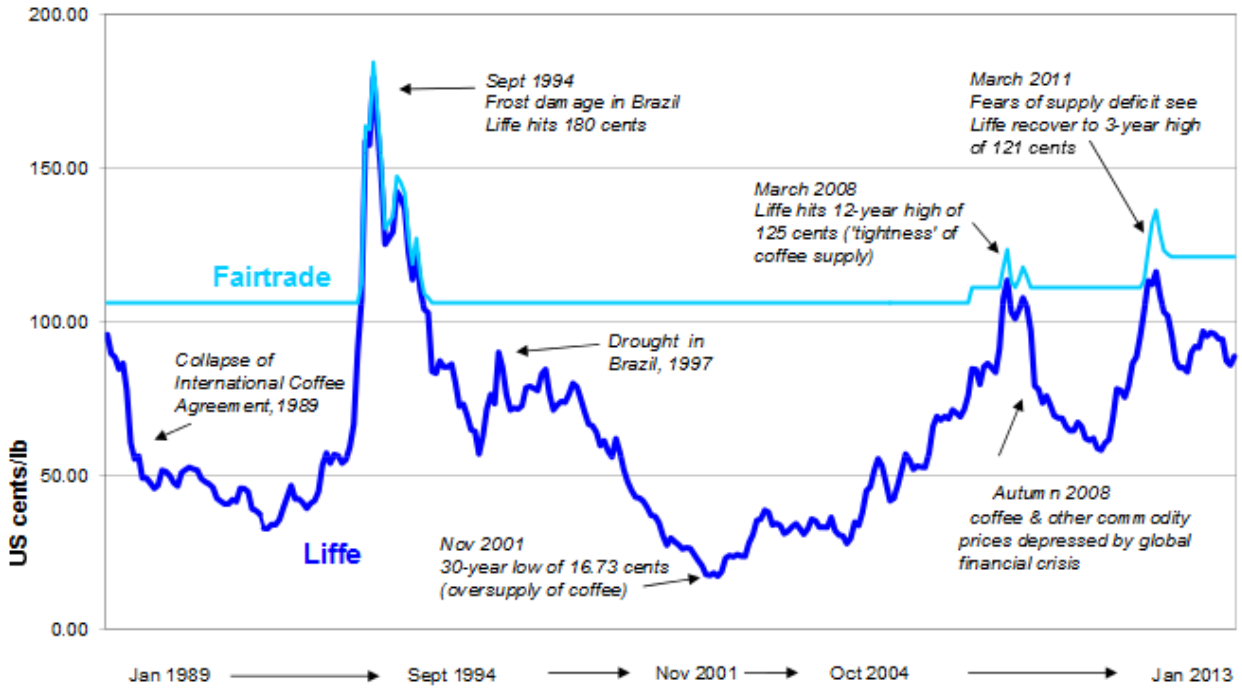
Fair Trade is a global movement of different organizations, opinions and approaches, which includes 59 developing countries (ICO, 2013). According to the World Fair Trade Organization, Fair trade is a trading partnership, based on dialogue, transparency and mutual respect. The aim is to empower small producers and improve their access to international market and thus reduce poverty. Majority of producers is a part of companies, which are considered as ethically responsible. Fair Trade helps them to sell their product which would be otherwise uncompetitive. Fair Trade offers to farmers and workers at the beginning of the chain the minimum price, premium, partially payment in advance, long term contracts and partnerships. On the other hand, farmers have to promise that they will protect environment, they will not use some pesticides, they will not employ children and nobody will be exploited. Fair Trade is not only about producers but also about consumers. The assumption of Fair Trade is "ethical consumer", someone who is willing to pay more for the same product. This statement is unfortunately in the opposite with the rationally behave (Fairtrade International, 2013). The certification is given by the Fairtrade labelling organization (FLO-CERT). Fair Trade coffee moreover comes from the same countries as the conventional produced coffee. These countries are Brazil, Colombia, Peru and Ethiopia.

Figure 13 - Fairtrade Label (Source: Flo-cert, 2013)

On the graphs below, there can be seen the comparison of New York price and fair trade price development in Arabica and Robusta coffee.

Graph 6 - Comparison of FT and NY prices in Arabica market, 1989-2013 (Source of data: Fairtrade, 2013)

Graph 7 - Comparison of FT and LIFFE prices in Robusta market, 1989-2013 (Source of data: Fairtrade, 2013)



According to Fairtrade Foundation (2013), since 2011, the level of minimum fair trade price of washed Arabica is 140 cents (formerly 125 cents) per pound, 135 cents is for unwashed Arabica and the fair trade minimum for unwashed Robusta is still 101 cents. When the New York price of Arabica is 140 cents or above, the fair trade price consists of New York price plus 20 cents (formerly 10 cents) – fair trade premium. During the period when the coffee market

price is depressed below the value of production, fair trade guarantees to producers minimum gain. The same principle is used in case of LIFFE price of Robusta.

Fair Trade coffee in Czech Republic

In 2010, in comparison with other fair trade products, coffee represented 40 per cent of total sales in the Czech Republic. In 2011 the proportion of coffee even increased to 63 per cent from the sale of all fair trade products. The increase in sales is caused particularly by retailers entering the market in 2010 and cafes entering the market in 2011. The high number is also influenced by company Tchibo, which started to sell certified coffee in its shops. The structure of selling places is highly changed. Firstly, certified products were sold in traditional small shops, now the situation changed and products are mainly sold in retail stores and restaurants (Fairtrade Česká Republika, 2013).

4.4.8.2 Organic certified

Organic certification is a process, which sets the rules for the whole supply chain. It starts at seeds suppliers and finishes at retailers or restaurants. The basic growing standards contain the minimum use of off-farm inputs, preservation of biodiversity, soil and water protection and prohibition of genetically modified organisms. There are different requirements and certification bodies for each country. The certification is overseen by the government or by the organizations as for example is the International Federation of Organic Agriculture Movements (IFOAM).
Here are the examples of logos of 1) EU, 2) United States, 3) Japan, 4) Australia and 5) Canada.

1)  2) 

3) 

4) 

5) 

Figure 14 - Logos of organic certification (Sources: European Commission 2013; USDA 2013; MAFF 2013; Australian Organic 2013; Organic Guide 2013)

4.4.8.3 Rainforest Alliance Certified

The Rainforest Alliance tries to prevent or at least reduce deforestation, climate change, wildlife and poverty. They want to keep sustainable living conditions for farmers, plantation workers and for the local population. The main idea is: If the keeping of rainforests is profitable

for international companies and communities, they will not cut them. So, this is the best way of rainforest sustainability. The ensuring of ecosystem must give to farmers and leaders of international companies, economic advantages. If the businesses meet these standards, the Rainforest Alliance will help to get them to the premium market, where supply for the sustainable goods and services, is very high. They are pushing the companies to their business behaved respectful of the environment, and they are also pushing people - customers to buy goods marked with a green frog. Businesses, farms and forestry enterprises that meet the strict standards of sustainability are authorized to use trademark. The little green frog is a symbol of environmental, social and economic sustainability (Rainforest-alliance, 2013).

Many coffee farms are located in areas which should be protected. According to ICO (2013), traditional coffee planting under the tree shadows is the best way how to protect wildlife.

Figure 15 - Rainforest Alliance Label (Source: Rainforest Alliance, 2013)

4.4.8.4 Bird Friendly Certified

The Smithsonian Migratory Bird Center was founded in 1991 in Washington, D.C. This organization investigates the causes of decreasing number of migratory bird populations. It informs general public about migratory birds and also about the need to protect them and their environment.

Planting of coffee brings a loss of acres of tropical forest. The Smithsonian Migratory Bird Center (SMBC) encourages the production of shade-grown coffee, and the protection of migratory birds. The Bird Friendly coffee is controlled and certified by USDA standards. The coffee can be classified as a Bird Friendly, if both conditions will be fulfilled. The first condition is the planting coffee according to the principles of organic agriculture. The second one is the planting under the shades of trees. The farmers get the certification, which is valid for three years. Organic inspectors can visit the farm during that time to control that the shade cover did not change much. Companies that sell and distribute coffee with Bird Friendly label contribute 25 cents per pound to support the Smithsonian Migratory Bird Centre's research and conservation programs (SMBC, 2013).

Figure 16 - Bird Friendly Label (Source: Smithsonian Migratory Bird center, 2013)

5. Practical part

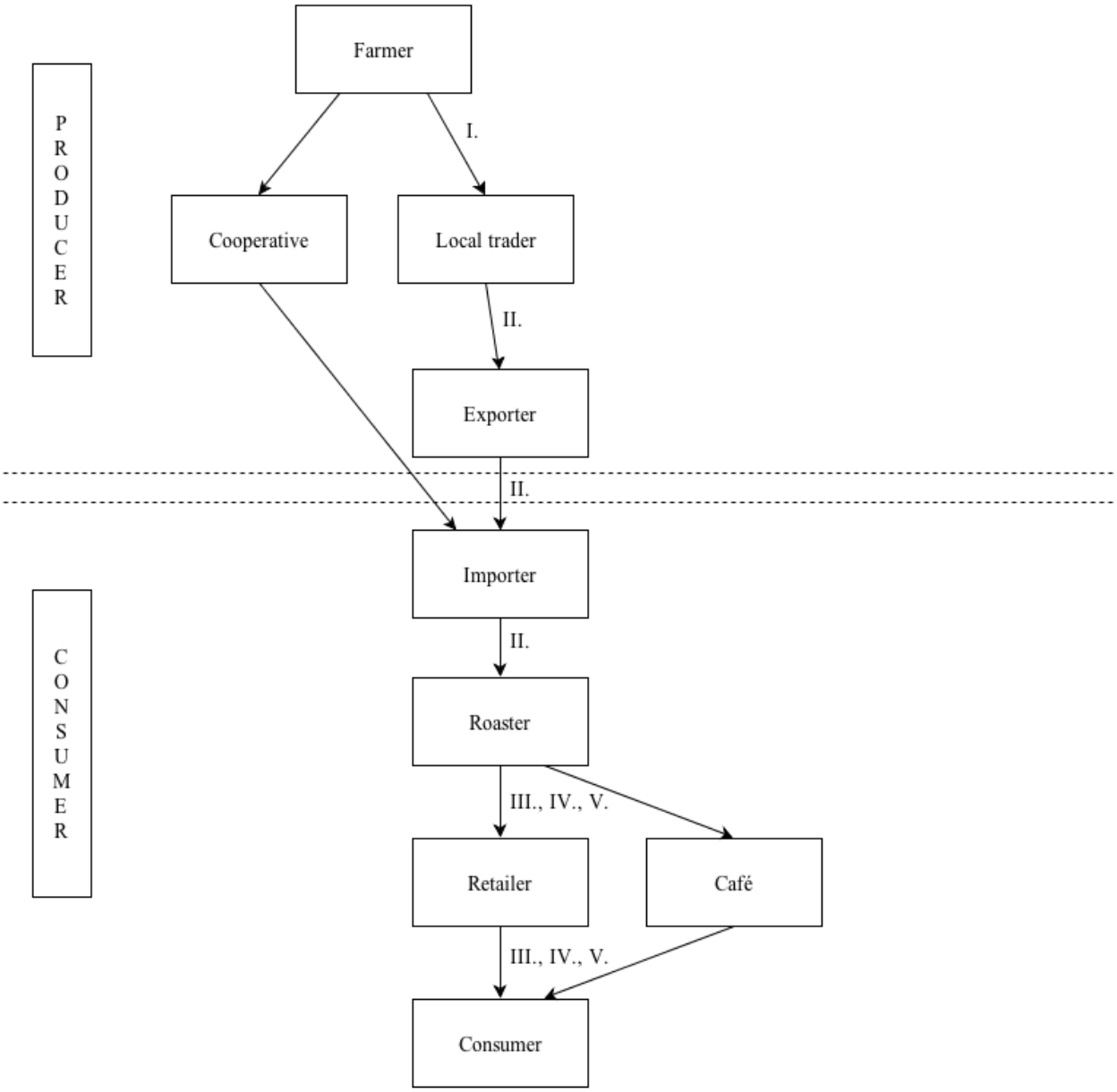
5.1 Global coffee chain analysis

The global coffee chain describes the production line of green coffee, usually in 60kg bags, which goes through many hands from the coffee berry to the final product sold in retail shops or cafés. Generally, there are 7 different stages until the coffee reaches the customer in a finished coffee product – package of roasted coffee, glass of instant coffee or even the bar with coffee flavour, shampoo or body cream with coffee aroma and many other products (Ponte, 2002). In the production country, coffee goes through three stages – farmer, local trader (or cooperative) and exporter. In the consuming country, coffee goes through four stages – importer, roaster, retailer and consumer. The coffee is sold moreover on foreign markets but some part is sold also on domestic markets.

Until 1970s, producers connected final market in only one or at most in two ways. During the last quarter of 20th century, many intermediaries entered the chain. Coffee is one of the most exported commodities in developing countries. It plays important economic role for Africa, Latin America and also Asia (Kaplinski, 2004).

In the graph below, there can be seen the coffee value chain. It is composed of key actors in coordinating the production and trade. This chain also describes their roles and stages of coffee development.

Diagram 1 - Coffee value chain (Source of data: own creation based on UNCTAD marketing chain, 2012 and studies of Gilbert, 2006; Ponte, 2002; Kaplinski, 2004)



Explanations:

I. Dry/ Parchment berries

II. Green beans

III. Instant coffee

IV. Roasted coffee

V. Roasted ground coffee

5.1.1 Farmers

The chain starts at farmers. They plant coffee in large farms – estate in Latin America and Kenya and in small-scaled farms in the rest of Africa (Kaplinski, 2004). Before the farmers sell their harvest, they have to pay the production costs, which include expenses for fertilizers, taking care and buying of equipment for harvesting and processing the berries. These costs are about US$1 per pound (Strictlycoffee, 2011). After the harvest, the berries are entering wet or dry process. The process is done by farmers, directly on farm or nearby. The result of the process is parchment beans – in case of Arabica coffee and dry beans – in case of Robusta coffee. Then farmers sell beans to the local trader or to co-operatives, sometimes even through independent exporters or through exporters owned by multinational export company. The price of these beans is based on coffee commodity market, and it is about $1.50 a pound for Arabica coffee and about $1.00 a pound for Robusta coffee, according to ICO (2013).

5.1.2 Local traders

The local traders buy dry beans or parchment beans from farmers. They transport beans from mountains to the local mills for transportation costs. When the coffee is cleansed from parchment skin, the traders transport the green coffee to the main ports, where they sell it to the exporters, who just buy it for the purchasing price. From which it follows that the local traders take a large part of the money from commissions of farmers. The local traders buy the coffee for very low price, because the farmers need money and so they sell their coffee often for any price. They have no access to the final market, so they do not know for how much they can sell coffee. According to Fairtrade Foundation (2012), even if the farmers know the real purchasing price, they are in a disadvantageous position, because there are a lot of farmers, but the local trader is very often only one and he has no competition in the area.

5.1.3 Exporters

The exporters buy the green coffee from the local traders in producing country. They transport the coffee to the importers. During the transport they have to pay export duty, which includes the cost of freight and insurance.

5.1.4 Importers

In consuming country, coffee is bought by importers (or traders), who sell green coffee to big roaster corporations or to roasting factories. When the coffee is imported to consuming country, its price rises because of insurance and cost of freight. This price is usually increased in 8 - 10 per cent.

5.1.5 Roasters

In factories, green beans are roasted or processed for an instant coffee. Sometimes, coffee can be roasted in producing countries. The expiration of instant coffee is about 6 months, so this form of coffee can be produced almost anywhere. The roasted ground coffee has to be processed only in the country of consumption (Kaplinski, 2004). Coffee processing firms sell directly to retailers – supermarkets, restaurants and cafés. The coffee market is controlled by big four coffee roasters: Sara Lee, Nestle, Proctor & Gamble and Kraft (Hays, 2011). They control is around half the global market. The roasters pay the roasting costs – the costs for roasting and costs in weight loss during roasting and the transport costs for transport coffee into the wholesale warehouse (Strictlycoffee, 2011).

5.1.6 Retailers

Finally, coffee products are delivered to retail shops or cafés, where end consumer can buy it. The retail product is in form of roasted coffee beans, roasted ground coffee or soluble (instant) coffee (Strictlycoffee, 2011). Retailers pay distribution costs for transportation to retail and coffee shops and they also pay for the marking of coffee.

5.1.7 Value added

In the value chain, each intermediary adds a value and also increases the price of coffee. Coffee prices are available on ICO, and they are determined by futures markets.

Coffee growers receive 7-10 per cent of the retail price of coffee in supermarkets, which imagines about 8-13 cents on every dollar spent on coffee. Exporters receive about 10 per cent. 55 per cent go to shippers and roasters. About 25 per cent go to retailers (Hays, 2009). In the

1970s, producers retained an average of 20 per cent of the retail price of coffee sold in a shop. During the coffee crisis, coffee growers received just 1-3 per cent of the price of a cup of coffee sold in a café in Europe or North America and 2-6 per cent of the value of coffee sold in supermarkets (Fairtrade Foundation, 2012).

5.1.8 Fair trade involved in value chain

The majority of fair trade small-scaled farms work under the co-operatives or farmers associations, certified by Fair trade. Fair trade pays the market price to the farmers, but it guarantees the minimum price. In case of washed Arabica, it is 140 cents per pound and 135 cents for unwashed Arabica. In case of Robusta, it is 101 cents. Fair trade also set the fair trade premium, added 20 cents more (for school, health care and so one).

In 2011, the average price for fair trade coffee, which was paid to cooperatives for processed coffee, was about 280 cents (Nicole LaPorte, NY times, 2013). But there can be problem of processed coffee in its flavour and quality which can change during the export. That is why the coffee is mainly sold to export in unprocessed form in lower price.

According to Fairtrade Foundation (2012), there can be the problem in paying farmers. In some models, farmers get the money after the coffee is sold in grocery. In Fair trade, farmers get money immediately, some even before. The process of transporting and roasting of coffee can take a lot of months or even a year. When the farmer is dependent on money, he cannot wait for money, because he needs them to cover his other costs associated with the cultivation of coffee.

Fair trade try to reduce costs by elimination of middleman, by creation of synergies (1+1>2). Farmers can sell their products directly to European or US markets. Synergy is the situation, when the resulting effect of simultaneously operating components is greater than the sum of the effects of the individual components (Adams, Ergonomics, 2013) In this case, export and import is managed by Fair trade partners. In consuming countries, it creates strong negotiation basis to get better conditions by coffee dealers and factories.

5.2 Future development in international coffee trade

There are two hypotheses set:

Hypothesis 1: The volume of exported coffee is increasing worldwide

Hypothesis 2: Arabica production decreases at the expense of Robusta production

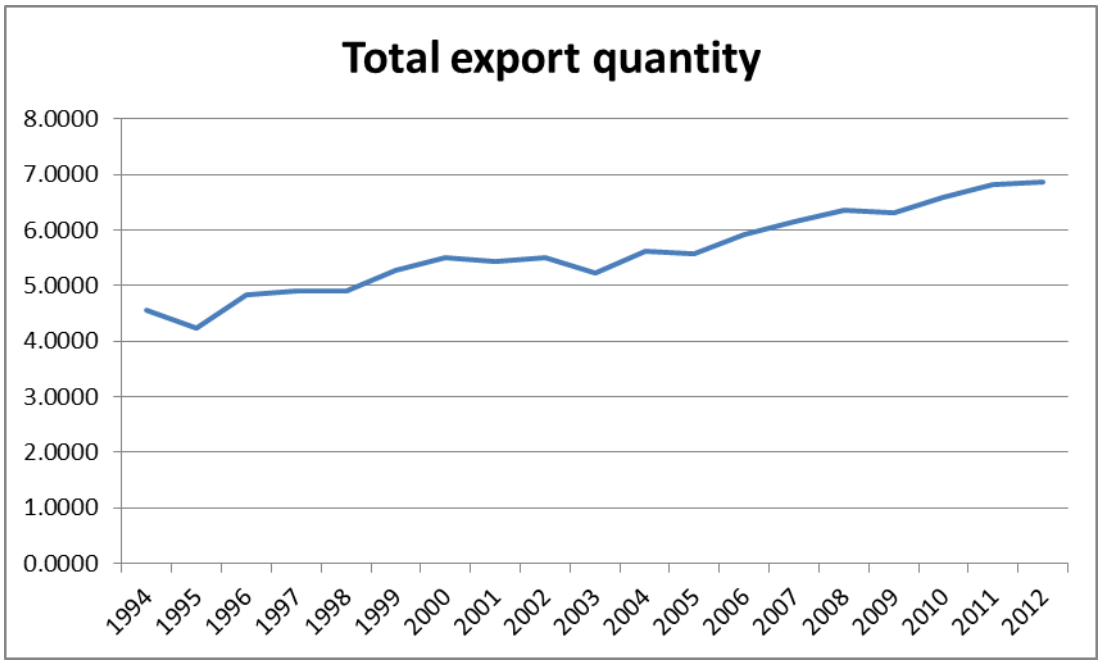
5.2.1 The volume of exported coffee is rising worldwide

The overall volume of coffee traded worldwide can be quite easily derived from that how much coffee is exported from producing countries or how much coffee is imported into the consuming countries. Due to the fact that some importing countries further deal with coffee – they re-export coffee to other countries, the statistical data for import could be very misleading. Therefore, the data of total exports are selected in this study. The chosen period is from 1994 to 2012 and it represents 19 years. Data for the years 1994 to 2010 come from FAOSTAT (2012) source. Last two years data are obtained from USDA (2013). The term "coffee", which is used in this study, means the green coffee berries – unprocessed. Coffee in such a form is the most exported one. The aim of this research is to create a forecast for the future three years, 2013, 2014 and 2015.

Process is as follows:

1) The time series of world coffee export is graphically analysed.

Graph 8 - Total export quantity (in million tonnes) (Sources of data: own creation based on FAOSTAT, 2012; USDA, 2013)



The time period is showed on axis "x". The axis "y" shows the volume of world coffee export in million tons.

2) The data are selected from the statistic data set of Food and Agriculture Organization of the United Nations – FAOSTAT (2012). The latest two data are found in the database of United States Department of Agriculture (2013).

Table 1 - Base data of time series (in million tonnes) (Sources of data: own creation based on FAOSTAT, 2012; USDA, 2013)

1994	**1995**	**1996**	**1997**	**1998**
4.5662	4.2397	4.8311	4.8994	4.9078
1999	**2000**	**2001**	**2002**	**2003**
5.2603	5.4987	5.4404	5.4925	5.2295
2004	**2005**	**2006**	**2007**	**2008**
5.6155	5.5767	5.9215	6.1576	6.3464
2009	**2010**	**2011**	**2012**	
6.3048	6.5809	6.8075	6.8645	

3) The basic characteristics of time series are calculated.

Table 2 - Basic characteristics of time series (in million tonnes) (Source of data: own calculation, 2013)

variable	min	max	average	number of observations	unit
volume of world export	4.2397	6.8645	5.6074	19	Million tonnes

4) The next step is a calculation of theoretical y, first differences, t-values and auxiliary inserted steps necessary for the following calculation.

Table 3 - Calculation of linear trend function (Source of data: own calculation, 2013)

year	y_i	1st differences	t_i	$y_i t_i$	t_i^2
1994	4.5662	-	-9	-41.0961	81
1995	4.2397	-0.3265	-8	-33.9177	64
1996	4.8311	0.5913	-7	-33.8174	49
1997	4.8994	0.0684	-6	-29.3967	36
1998	4.9078	0.0084	-5	-24.5391	25
1999	5.2603	0.3525	-4	-21.0411	16
2000	5.4987	0.2384	-3	-16.4961	9
2001	5.4404	-0.0583	-2	-10.8809	4
2002	5.4925	0.0520	-1	-5.4925	1
2003	5.2295	-0.2630	0	0.0000	0
2004	5.6155	0.3860	1	5.6155	1
2005	5.5767	-0.0388	2	11.1533	4
2006	5.9215	0.3449	3	17.7646	9
2007	6.1576	0.2360	4	24.6302	16
2008	6.3464	0.1888	5	31.7320	25
2009	6.3048	-0.0416	6	37.8290	36
2010	6.5809	0.2760	7	46.0661	49
2011	6.8075	0.2266	8	54.4598	64
2012	6.8645	0.0570	9	61.7803	81
Σ	-	-	-	74.3533	570

5) Linear Regression (Trend Function)

Trend is the long-term movement in time series. It tells whether a data set has increased or decreased over the period of time. A trend line can be created by precise method when the determination of the location and slope of line is used by linear regression. The typical trend line is straight. Linear regression is a function, which shows the relationship between the dependent variable "y" and one or more independent – explanatory variables "x1, x2,….xm". In this case, it is a simple linear regression, because the function contains only one explanatory variable.

The basic formula for linear trend function is:

$Y = a + bx$ $\quad a = \overline{y_t}$ $\quad b = \frac{\sum yt}{\sum t^2}$

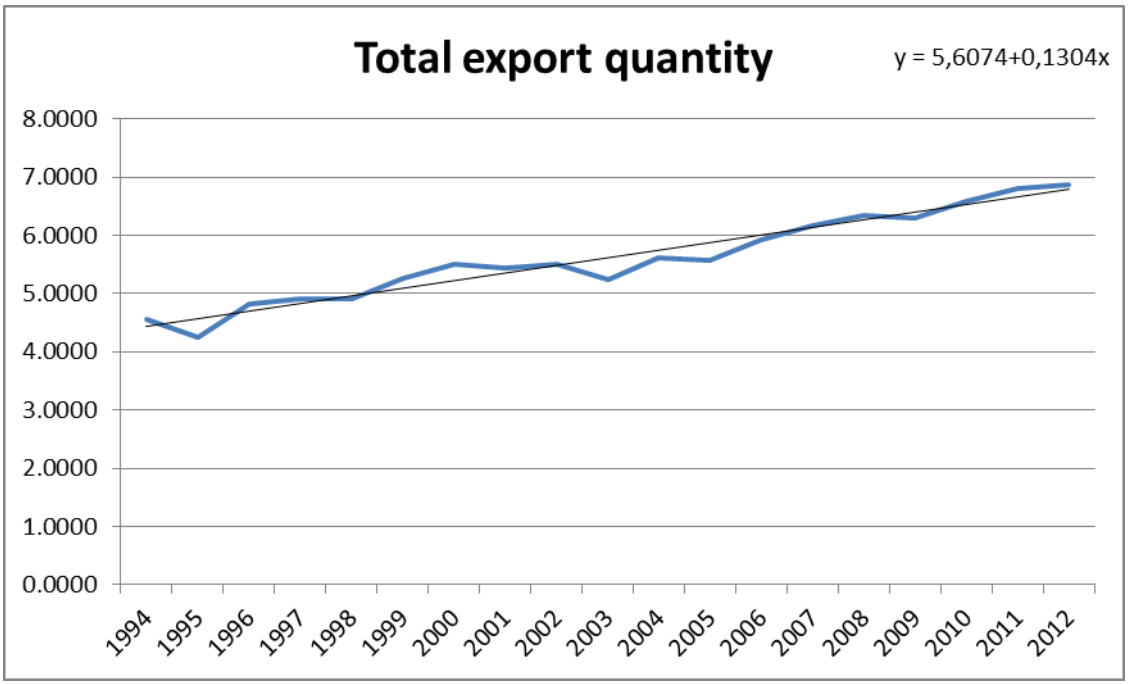
$a = \frac{106.5410}{19}$ $\quad b = \frac{74.3533}{570}$

$a = 5.6074$ $\quad b = 0.1304$

$Y = 5.6074 + 0.1304t$

6) The calculated formula and a straight line are inserted into the graph.

Graph 9 - Total export quantity (in million tonnes) (Source of data: own calculation, 2013)



7) Verification of trend function

In this stage, there has to be calculated the Coefficient of determination. This coefficient compares the actual values of "y" and their estimated values. It reaches the values in the range from 0 to 1. If the coefficient of determination is equal to 1, there is a perfect correlation, while there is no difference between the estimated and actual values of "y". If the coefficient of determination is equal to 0, then it can be said that the trend function cannot forecast the value of theoretical "y" correctly.

$$R^2 = \frac{S\hat{y}^2}{Sy^2} \qquad R^2 \in \langle 0,1 \rangle$$

$$S\hat{y}^2 = \frac{\Sigma(\hat{y}-\bar{y})^2}{n}$$

$$Sy^2 = \frac{\Sigma(y_{real}-\bar{y})^2}{n}$$

Table 4 - Calculation of coefficient of determination (in million tonnes) (Source of data: own calculation, 2013)

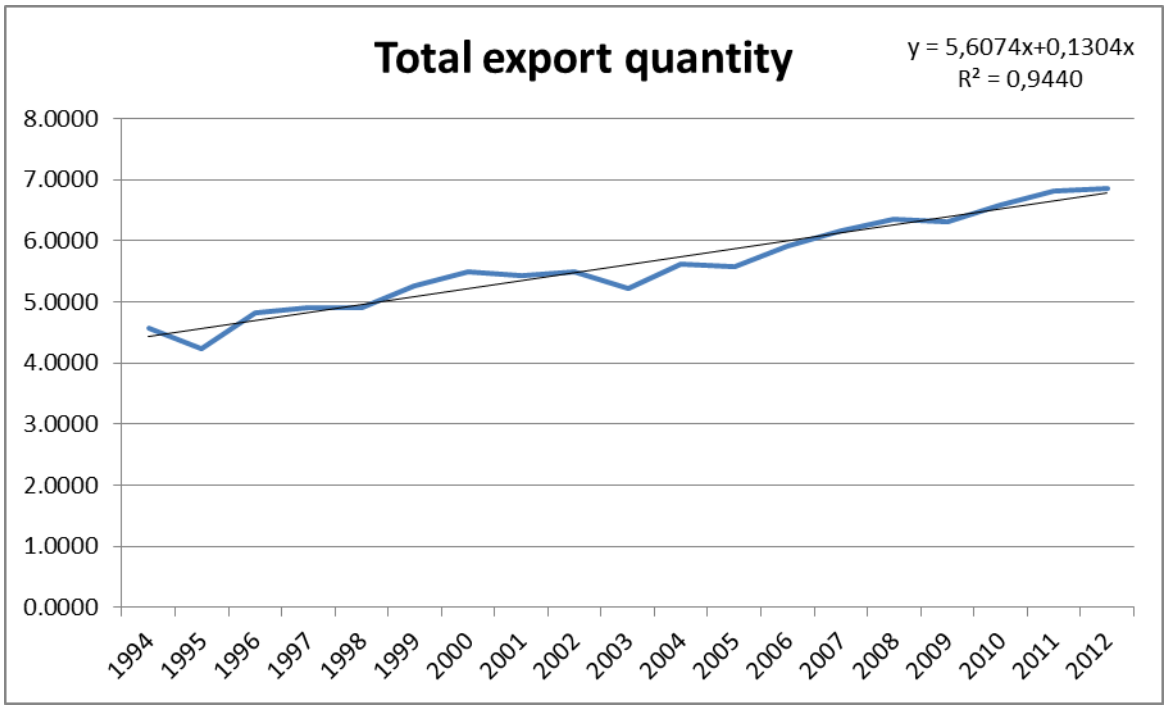
Number of observation	year	y real	$\hat{y}$	$\bar{y}$ real	y real - $\bar{y}$	$(y \text{ real} - \bar{y})^2$	$(\hat{y} - \bar{y})$	$(\hat{y} - \bar{y})^2$
-9	1994	4.5662	4.4338	5.6074	-1.0412	1.0840	-1.1736	1.3773
-8	1995	4.2397	4.5642	5.6074	-1.3677	1.8706	-1.0432	1.0883
-7	1996	4.8311	4.6946	5.6074	-0.7763	0.6027	-0.9128	0.8332
-6	1997	4.8994	4.8250	5.6074	-0.7080	0.5012	-0.7824	0.6121
-5	1998	4.9078	4.9554	5.6074	-0.6996	0.4894	-0.6520	0.4251
-4	1999	5.2603	5.0858	5.6074	-0.3471	0.1205	-0.5216	0.2721
-3	2000	5.4987	5.2162	5.6074	-0.1087	0.0118	-0.3912	0.1530
-2	2001	5.4404	5.3466	5.6074	-0.1670	0.0279	-0.2608	0.0680
-1	2002	5.4925	5.4770	5.6074	-0.1149	0.0132	-0.1304	0.0170
0	2003	5.2295	5.6074	5.6074	-0.3779	0.1428	0.0000	0.0000
1	2004	5.6155	5.7378	5.6074	0.0081	0.0001	0.1304	0.0170
2	2005	5.5767	5.8682	5.6074	-0.0307	0.0009	0.2608	0.0680
3	2006	5.9215	5.9986	5.6074	0.3141	0.0987	0.3912	0.1530
4	2007	6.1576	6.1290	5.6074	0.5502	0.3027	0.5216	0.2721
5	2008	6.3464	6.2594	5.6074	0.7390	0.5461	0.6520	0.4251
6	2009	6.3048	6.3898	5.6074	0.6974	0.4864	0.7824	0.6121
7	2010	6.5809	6.5202	5.6074	0.9735	0.9476	0.9128	0.8332
8	2011	6.8075	6.6506	5.6074	1.2001	1.4402	1.0432	1.0883
9	2012	6.8645	6.7810	5.6074	1.2571	1.5803	1.1736	1.3773
					Sy^2	0.5404	$S\hat{y}^2$	0.5101

$$R^2=\frac{0.5101}{0.5404}$$

R^2=0.9440

The calculations demonstrate that the trend line is corresponding with the real values from 94.40 per cent.

Graph 10 - Total export quantity with coefficient of determination (in million tonnes) (Source of data: own calculation, 2013)



8) Prognosis ex ante

The future forecast values will be calculated according to the following function: y = 5.6074 + 0.1304x with the coefficient of determination 0.9440. In the equation is the "x" substituted by numbers 10, 11 and 12. These numbers do not mean the years, but they mean the numbers of observation for real years 2013, 2014 and 2015.

Graph 11 - Prognosis for the years 2013, 2014 and 2015 (in million tonnes) (Source of data: own calculation, 2013)

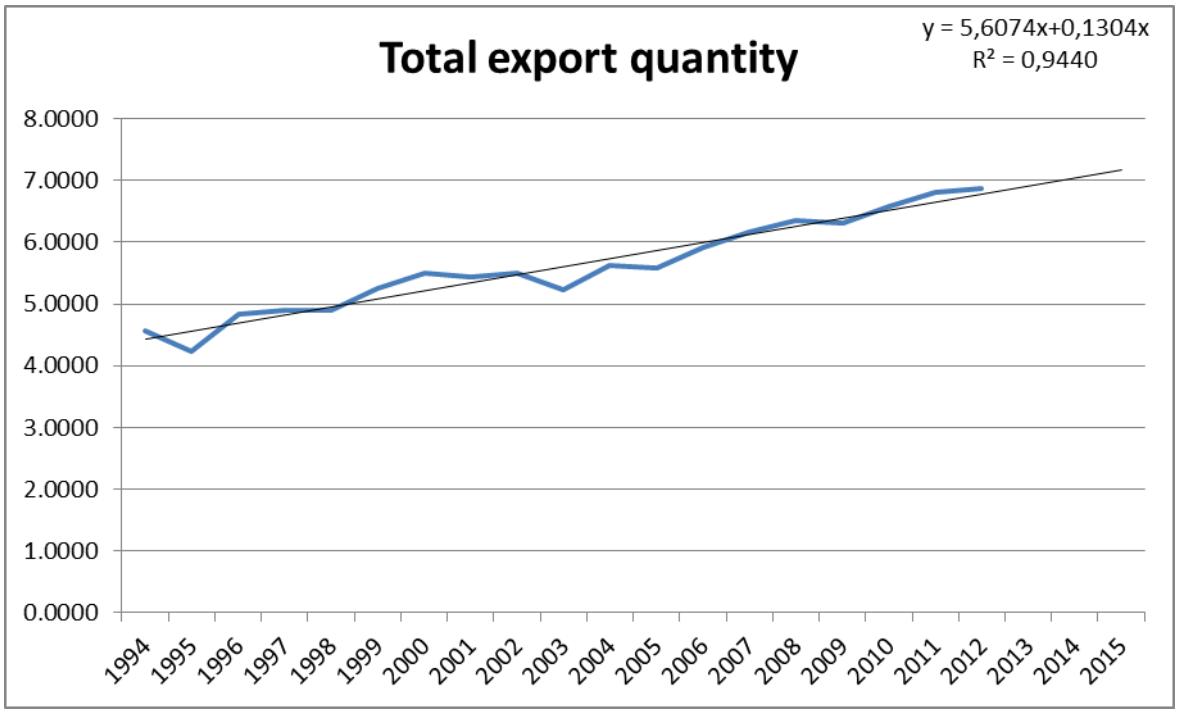


Table 5 - Forecasted values of world export (in million tonnes) (Source of data: own calculation, 2013)

year	2013	2014	2015
forecasted value of world export	6.9114	7.0418	7.1722

The prognosis is based on simple statistic function which simulates the trend in rising of exported coffee. The hypothesis is confirmed.

5.2.2 Arabica production decreases at the expense of Robusta production

Due to the fact that the cultivation and processing of Arabica is financially and skillfully more challenging than the cultivation and processing of Robusta, there is set the hypothesis that the higher quality Arabica production begins to decrease at the expense of cheaper and easier cultivation of Robusta.

From the largest growers of coffee, according to FAOSTAT (2012), were selected 9 producers who grow both varieties of coffee at least in the quantity from which it can be inferred that Robusta is pushing Arabica out of fields.

The selected countries are:

1. Brazil
2. Mexico
3. Vietnam
4. Indonesia
5. India
6. Uganda
7. Tanzania
8. Ecuador
9. Sri Lanka

The table below shows the 9 selected countries and their total production of coffee in last 23 years.

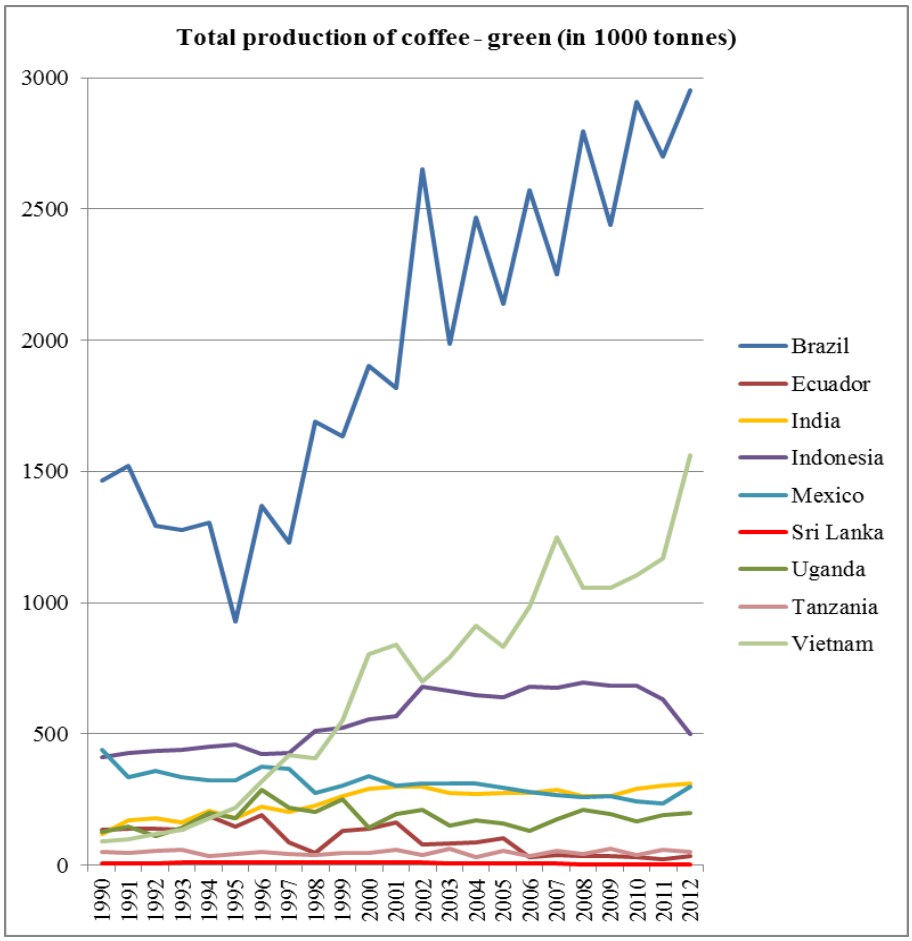
Table 6 - Total coffee production (in 1000 tonnes) of selected producers (Source of data: own based on FAOSTAT, 2013; USDA, 2013)

Total production of coffee - green (in 1000 tonnes)																								
year/country	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Brazil	1465	1520	1294	1279	1307	930	1369	1229	1689	1632	1904	1820	2650	1987	2466	2140	2573	2249	2797	2440	2907	2700	2952
Ecuador	135	139	138	137	187	148	191	87	48	133	138	165	79	83	87	103	31	39	37	34	31	24	36
India	118	170	180	162	208	180	223	205	228	265	292	301	301	275	271	276	274	288	262	262	290	302	312
Indonesia	413	428	437	439	450	458	422	427	512	525	555	569	682	664	647	640	682	676	698	683	684	634	498
Mexico	440	334	360	336	325	325	374	368	277	302	338	303	313	311	312	294	280	269	260	264	245	237	300
Sri Lanka	8	8	9	10	11	11	12	11	10	11	10	10	10	9	8	7	6	6	5	5	5	5	2
Uganda	129	147	110	145	198	181	288	220	205	252	143	197	210	151	170	158	133	175	212	196	167	191	200
Tanzania	53	46	56	60	34	42	52	44	38	47	48	58	38	62	33	54	34	55	43	62	40	61	51
Vietnam	92	100	119	136	180	218	320	421	409	553	803	841	700	794	914	831	985	1251	1056	1058	1106	1168	1560

primarily Robusta
primarily Arabica

Growers who are dominated in the Arabica cultivation are: Brazil, Mexico, Tanzania and Ecuador. Major growers primarily of Robusta are: Vietnam, Indonesia, India, Sri Lanka and Uganda.

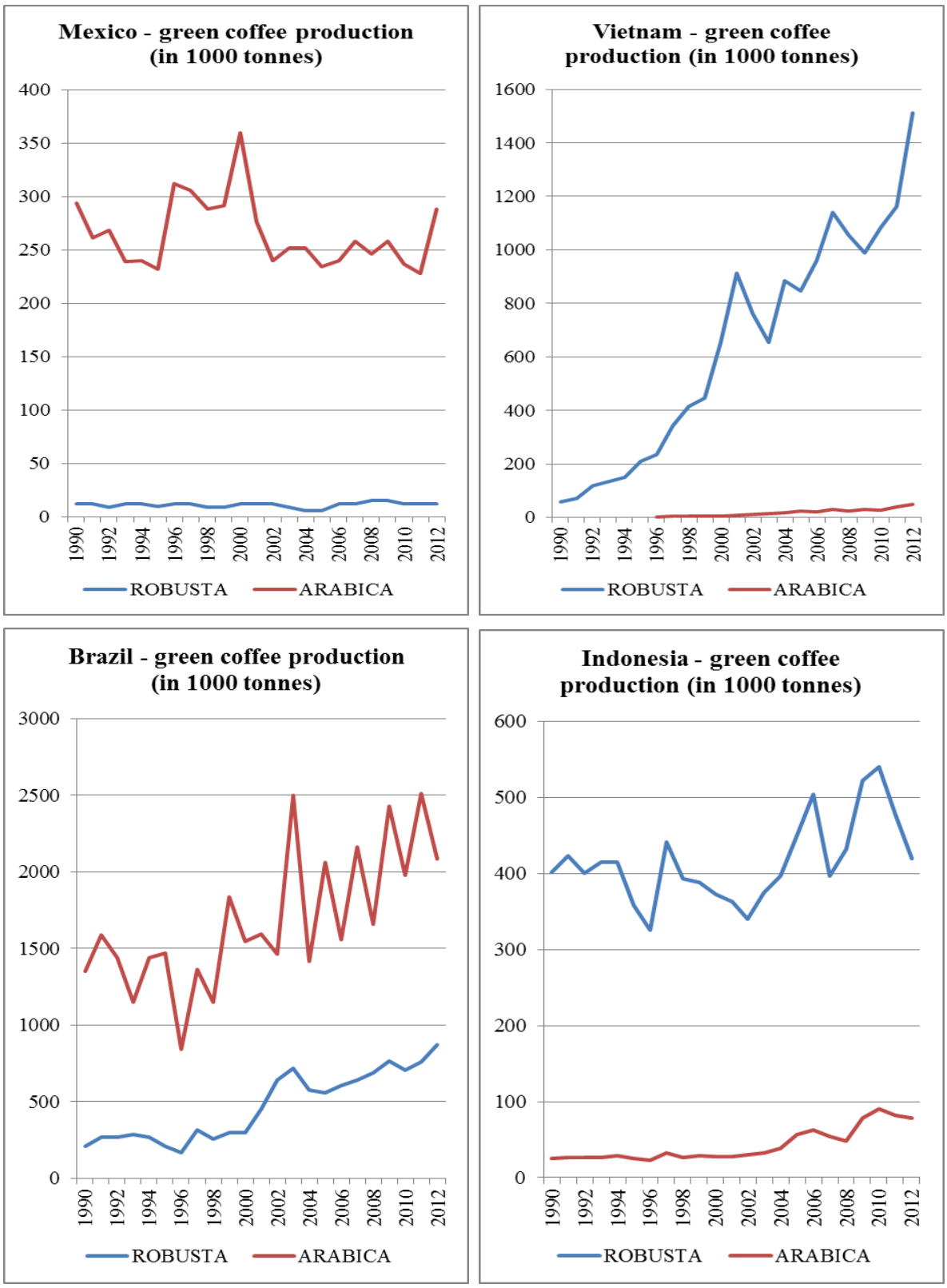
Graph 12 - Nine selected coffee producing countries in period 1990-2012 (Source of data: own creation based on FAOSTAT, 2013; USDA, 2013)



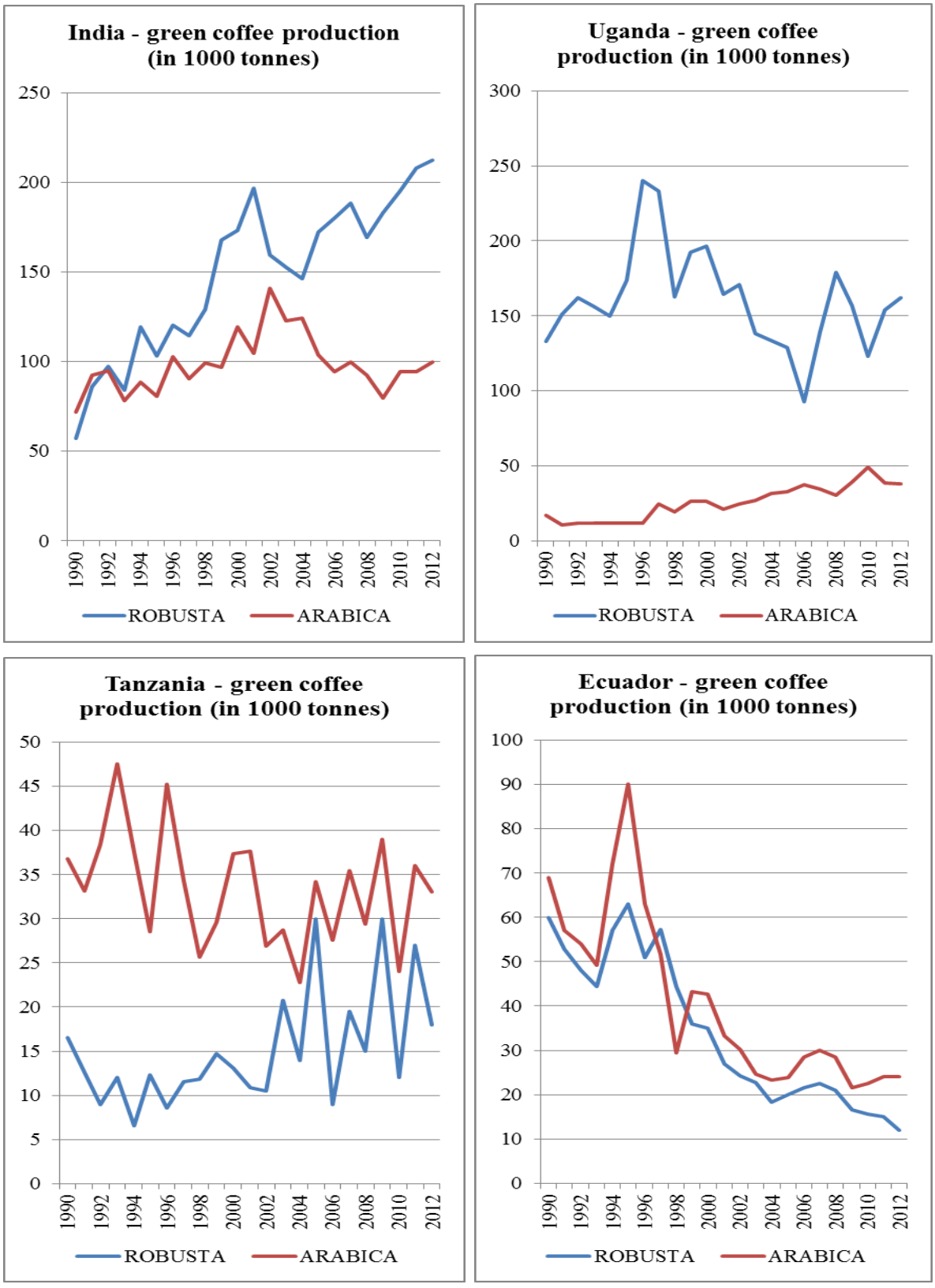
From the graph above there can be seen how the coffee production is developing in period 1990 – 2012 in each of chosen producing country. Brazil is growing steeply upward as well as Vietnam.

The research suggests that the determined hypothesis will be confirmed if production of Arabica and Robusta is compared in each selected country separately. Therefore there is created a graph containing both types of coffee production for each country.

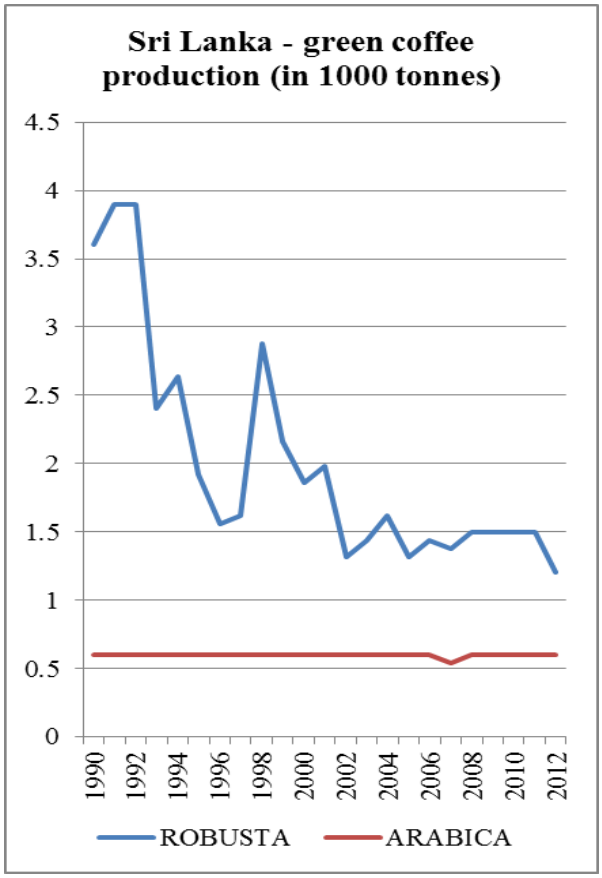
Graphs 13-16 - Production of both types in Mexico, Vietnam, Brazil, Indonesia (Source of data: own creation based on FAOSTAT, 2013; USDA, 2013)



Graphs 17-20 - Production of both types in India, Uganda, Tanzania, Ecuador (Source of data: own creation based on FAOSTAT, 2013; USDA, 2013)



Graph 21 - Production of both types in Sri Lanka (Source of data: own creation based on FAOSTAT, 2013; USDA, 2013)



In Mexico, mainly cultivated coffee is Arabica. Its production is much higher than the production of Robusta. The average production is around 250 thousand of tonnes. On the other hand, the average amount of Robusta production is about 12 thousand of tonnes, in selected period. Arabica growing is slightly declining, but it does not seem that the reason of this situation comes from influence of Robusta growing.

For many decades, Robusta coffee has been cultivating in Vietnam. The biggest increase of Robusta production is observed between years 1999 - 2000 and 2006 - 2007. The Arabica is growing there since 1996 up to now in very small quantities. In 2004 the Arabica exceeded 15 thousand tonnes. Since that time it is constantly growing. Today, the amount of production is almost three times larger than the amount in 2004, but in comparison with the production of Robusta coffee, it represents almost negligible amount.

Brazil is major producer of Arabica coffee. The biennial cycle of Arabica of higher and lower yield is pretty seen in the graph. Between 2000 - 2002 decreases production Arabica, but biennial cycle is maintained. On the contrary, there is recorded an increase in the production of Robusta in the same time period.

In Indonesia, there is growing 10 to 20times larger quantity of Robusta than Arabica. The graph does not show the relationship between the cultivation of these two types of coffee.

India is one of two countries of selected nine that clearly confirms the hypothesis. The quantity of grown Arabica and Robusta does not differ so essentially as in case of Mexico, Vietnam and Indonesia. Until 2004, there was produced almost the same amount of Arabica as Robusta. Since that time, the ways of both types are diverging significantly. Arabica is decreasing at expense of Robusta.

Uganda is producer of Robusta coffee predominantly. In the graph, there can be seen the relationship of Robusta and Arabica in 2008 and 2012, when the Arabica decreases at expense of Robusta.

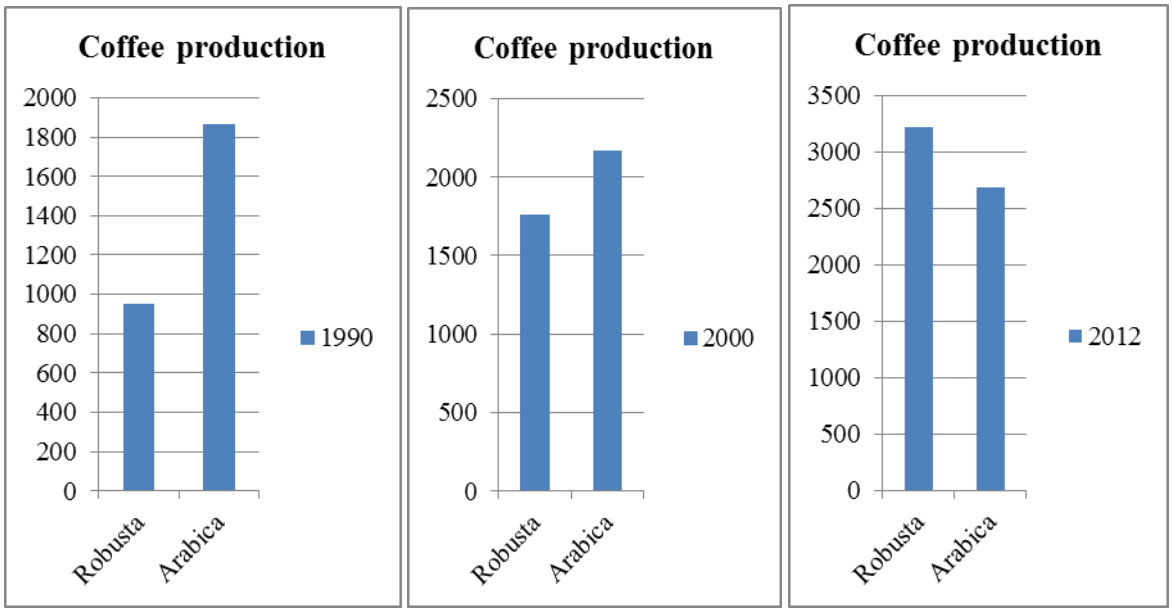
In 1990, Tanzania was known as a grower of Arabica coffee, it produced 37 thousand tonnes of Arabica and only 16 thousand tonnes of Robusta. Since that time the Arabica production started to decrease and on the other hand, Robusta begun to grow. Since 2003, Robusta has been reaching almost the same level as Arabica. In 2005, there was produced only about 5 thousand tonnes less of Robusta than Arabica. Tanzania is the second country which confirms the set hypothesis.

In Ecuador, there can be seen rapid decline of both Arabica and Robusta production. In 1990, Ecuador produced 60 thousand tonnes of Robusta and 69 thousand tonnes of Arabica coffee. Now, in 2012, there were produced only 12 thousand tonnes of Robusta and 24 thousand tonnes of Arabica.

In Sri Lanka, Robusta production decreased from 3.6 thousand tonnes in 1990 to 1.2 thousand tonnes in 2012. Production of Arabica is still the same for twenty years, and it keeps the level at 600 tonnes per year.

The hypothesis cannot be clearly confirmed right now, because the method of comparing development of two types of coffee production in individual countries does not show the relationship between Arabica and Robusta in 7 out of 9 countries. Reducing production of Arabica at the expense of Robusta is confirmed only in India and Tanzania. For unambiguous confirmation of the hypothesis is compared the total production of Robusta and Arabica in selected nine countries in years 1990, 2000 and 2012.

Graphs 22-24 - Coffee production in selected 9 countries (in 1000 tonnes) in years 1990, 2000, 2012 (Source of data: own creation based on FAOSTAT, 2013; USDA, 2013)



In 1990, the Arabica production is two times larger than production of Robusta. After 10 years, in 2000, there can be seen still the larger amount of produced Arabica, but the ratio is not so large as in 1990. In 2012, the situation is nearly opposite to year 2000. These three graphs unambiguously show the higher quality Arabica production is decreasing at the expense of production of lower quality Robusta.

The comparison of total Arabica and Robusta production in selected nine producing countries, where the both types of coffee are grown, is more significant in the confirmation of this hypothesis. Hypothesis is finally confirmed.

6. Results and Discussion

The history of coffee dates to 15th century to Ethiopia and its neighbour across the Red Sea, Yemen. The coffee was spread into the Europe and United States by Dutch people and Italians. Later on, the coffee was spread into the rest of the world.

The coffee plant is always green shrub, tree or creeper with white flowers and red berries. The fertility period lasts around 30 years. There exist two main species of coffee – Arabica and Robusta. The rest are Liberica and Excelsa. Arabica can be harvested two or three times per year. Robusta, the more resistant one and it can be harvested only once per year. Each berry contains of two seeds. The difference between Arabica and Robusta coffee bean is in the shape of furrow. Arabica´s shape resembles the shape of the letter "S". Robusta is stronger in content of caffeine. The coffee plants are cultivated between the Tropics of Cancer and Capricorn. Arabica is cultivated in high sea levels, Robusta is grown in lowlands. According to FAO (2012), there exist four methods of coffee harvesting: stripping, combing, machine collecting and handpicking. Coffee is processed by two methods. The wet method is used mainly for Arabica coffee. Robusta is processed by cheaper dry method. Then the coffee green can be roasted and grind. The coffee beverage can be drunk as a strong short cup, instant coffee or it can be decaffeinated.

According to UNCTAD (2013), today, more than 130 million bags of coffee are produced per year and the number is rising by every year. The four largest producers are Brazil, Vietnam, Colombia and Indonesia. Brazil is the first most produced country of Arabica coffee and the second most produced country of Robusta coffee. Vietnam is the largest producer of Robusta. Colombia produces only Arabica and on the other hand, Indonesia specializes in Robusta (FAOSTAT, 2013). The supply of coffee is determined by biennial cycle (in case of Arabica), weather conditions and diseases. The coffee consumption is increasing. The highest consumption is found in United States, Brazil and Germany. The biggest coffee drinkers come from Finland, Norway and Danish. The average Finn drinks almost 12 kg per year. In comparison, the average consumption in Czech Republic is 4 kg per head and year. Coffee is one of the most drinkable beverages, after water and tea. According to Čermák (2008), the global demand for coffee is inelastic and it is still increasing.

Coffee is the most traded agriculture commodity and the fourth most traded commodity in the world, according to ICO (2013). The International Coffee Organization includes exporting

and importing countries and it tries to regulate the coffee market. Its members represent 97 per cent of world production and over 80 per cent of world consumption. The largest exporters are Brazil, Colombia, Vietnam, Germany, Peru and Indonesia. Germany is together with Belgium and Switzerland one of the largest re-exporters. The biggest importers are European Union, United States of America, Norway and Switzerland. The coffee market in influenced by the Big Four, which includes the coffee corporations such as Nestlé, Procter and Gamble, Mondeléz International (formerly Kraft Foods) and Hillshire Brands and D.E Master Blenders 1753 (formerly Sara Lee).

Coffee price is quite volatile. The pound of Arabica costs around US $ 1.6. Robusta Is cheaper, its price is around US $ 1, according to ICO (2013). The price of Arabica is influenced by weather conditions, by price of Robusta and by big roaster companies. The coffee as a commodity is traded in futures markets. According to UNCTAD (2012), there are two main futures exchanges. Robusta is traded at NYSE LIFFE in London. ICE Futures U.S. in New York sets the prices and trades with Arabica coffee. The coffee crisis is dating since 1989, when the coffee cartel collapsed. In 2001, one pound of coffee cost only US$45 cents. The big roasters who helped to increase the Robusta production in Vietnam and Indonesia are found as one of the biggest reason of coffee crisis. Depending on the crisis, there were created many sustainable movements in coffee production and trade. The main sustainable approaches are the Fairtrade, the Organic, Rainforest Alliance and Bird Friendly approach.

Global coffee value chain is created based on UNCTAD marketing chain (2012) and studies of Gilbert (2006), Ponte (2002), Kaplinski (2004) and many other scientific articles available at mainly web pages. The studies and chains were compared and the final version of the simplified chain was created. The chain is divided into two parts according to producing and consuming countries. There are described the main entities of the whole process since the coffee is harvested to the time of coffee consumption. In the production country, coffee goes through three stages – farmer, local trader/ cooperative and exporter. In the consuming country, coffee goes through four stages – importer, roaster, retailer/ café and consumer. In the value chain, there are also mentioned the forms of coffee in every stage. The farmer´s harvest is divided into dry or parchment berries depending on the type of coffee. Through the local traders who bring the coffee to local mills is processed into green beans, which are traded in unchanged form through exporters and importers to roasters. In roaster factories the form of coffee is processed into roasted coffee, roasted ground coffee of soluble coffee. Then the coffee is delivered through

retailers or through cafés to the final consumer. Mr. Gilbert (2006) includes only supermarkets and retailers in the last part of chain, before it is reached by consumer. In this part, I agree with Mr. Ponte (2002) and I have integrated also cafés into my chain, because the cafés have a huge proportion of sales of processed coffee. The chain can be divided into local chain of international one. The local chain is surely shorter. It includes 5 stages – farmer, trader, local roaster and wholesalers/ retailers. Finally, the local value chain was not created, because the diploma thesis is focused on international trade and because of the fact that the majority of coffee goes through international chain. In the chain should have to be included the added values in each stage. The limitations of this idea were found in old available data and in the fact that value added in each stage is changing almost from year to year and the fact that the value added very differs from continent to continent or even from country to another one. So, the result was found in the fact that the added value cannot be generalized and cannot be included in global coffee value chain. Under the chain, there is also described the considerable role of Fair Trade movement.

Future development in international coffee trade is based on confirming or rejecting set two hypotheses. The hypothesis that the volume of exported coffee is increasing worldwide, is confirmed. The hypothesis that Arabica production decreases at the expense of Robusta production, is confirmed as well.

The first hypothesis is confirmed by linear trend function and comparing of absolute values of import and export in selected regions. The suitability of the model applied in this part of the research is confirmed from 94.4 per cent. This fact is for determining the future perspectives in amount of internationally traded coffee, sufficient. The results of this part of research are the forecasts for the next three years, 2013, 2014 and 2015. If compare the results from studies of Faostat (2010), annual reports of ICO (2012) and Mr. Drakoln (2013) research study in theoretical part with the results in practical part, the conclusion is that world coffee export is growing.

The second hypothesis is confirmed by comparative methods of created charts and scientific articles of nine authors. The hypothesis is based on statement of Mr. Prince (2002) and Mr. Stein (2002). Mr. Prince (2002) says that the roaster organizations care about high yields and profits. This statement, according to him, resulting in the situation when good quality coffee is being replaced by low quality one → Arabica is being replaced by Robusta. He also says that there will be shortage of any quality coffee in near future and soon the big roasters will pay US $3 per pound for the low quality coffee from Vietnam. Mr. Stein (2002), the other researcher,

adds that the planting of Robusta has short-term economic advantage and it is overshadowed by long-term costs for growers, drinkers and even for the roasters, who are trying to persuade governments of individual countries to focus exclusively on growing Robusta.

From the largest growers of coffee, according to FAOSTAT (2012) and the data from USDA (2013), are selected 9 producers who grow both varieties of coffee at least in the quantity from which it could be inferred that Robusta is pushing Arabica out of fields. The chosen producing countries are Brazil, Mexico, Vietnam, Indonesia, India, Uganda, Tanzania, Ecuador and Sri Lanka. The line charts are created from the datasets mentioned above.

In case of Mexico, Mr. Godoy (2010) says that growers of the more expensive Arabica coffee beans are promoted by its government to grow cheaper Robusta beans. He also says that the ministry of agriculture launched program that boost production of Robusta coffee in nine of Mexico's 32 states. Mr. Steve (2010) adds that this government program is initiated by the global giant Nestlé. The move comes as a result of a greater global demand for instant coffee, which is commonly made from lower quality varieties such as Robusta. The created graph does not confirm this statement probably because of short duration government program, which could not be reflected in the Mexican coffee market in such a short time interval.

The more and more shipments of Robusta are sending into the Arabica´s producing countries as Mexico (Almeida and Abrahams, 2012). According to Radford (2012), Vietnam wants to double rise of output of Arabica by 2020. The statement of these authors is shown in the graph, Robusta is steadily increasing, Arabica is increasing also, but the set hypotheses cannot be confirmed.

The created graphs for Brazil, Indonesia and Uganda do not confirm the hypotheses, because there is a huge dominance of one type of coffee. In Brazil, the increase of Robusta production is seen, but it does not look like that it negatively affects the production of Arabica.

According to Mr. Girijashankar (2012), Arabica plantations are rapidly being replaced by Robusta plantations in India. In spite of the meaning that Indian Arabica is famous in world coffee market, increasing cost of production have forced growers to convert their Arabica plantations to Robusta ones. The created graph confirms the set hypotheses and also the statement of Mr. Girijashankar. In 2012, Arabica production reaches only a half of Robusta production.

According to study from Agritrade (2011), big emerging markets such as China and Russia are starting to consume instant coffee. That is the reason, why Tanzania is step by step focusing more in Robusta planting. The second reason is because of Robusta´s better resistance, so Tanzanian farmers can save money for protective sprays - production costs. The created graph confirms the hypotheses and also confirms the study of Agritrade. There can be seen the decrease of Arabica production at expense of Robusta production.

In Ecuador, there is rapid decreasing of both types coffee production. Similar case is seen in Sri Lanka graph, the Robusta production is decreasing, and Arabica low production is still the same during the last 22 years.

The hypotheses cannot be clearly confirmed by comparison of line charts of individual countries. It does not show the relationship between Arabica and Robusta in 7 out of 9 countries. Reducing production of Arabica at the expense of Robusta is confirmed only in India and Tanzania. For unambiguous confirmation of the hypothesis, there is compared the total production of Robusta and Arabica in selected nine countries in years 1990, 2000 and 2012 in created column charts. The results show that the Arabica production is two times larger than production of Robusta in 1990. After 10 years, in 2000, there can be seen still the larger amount of produced Arabica, but the ratio is not as large as in 1990. In 2012, the situation is nearly opposite to year 2000. These three graphs unambiguously show the higher quality Arabica production is decreasing at the expense of production of lower quality Robusta. The comparison of total Arabica and Robusta production in selected nine producing countries, where the both types of coffee are grown, is more significant in the confirmation of this hypothesis. Hypothesis is finally confirmed. As the Turkish proverb which was mentioned at the beginning of the thesis, says: "*Coffee should be black as hell, strong as death, and sweet as love.*" This research unfortunately confirms that farmers of high quality coffee beans are pushed by government plans to grow cheaper and low quality coffee beans. And so the coffee is not often black as hell, strong as death and sweet as love.

7. Conclusions

The diploma thesis is focused on international coffee production and trade. The first part brings important, interesting and the most current findings from the coffee world. From theoretical point of view, the comparison of production, consumption and trade with this unique commodity, answers the questions from introduction part. The biggest coffee producers are Brazil, Vietnam, Colombia and Indonesia. The Arabica coffee is planted in Brazil and Colombia. Vietnam and Indonesia are the largest producers of Robusta coffee. The countries with the highest coffee consumption are United States, Brazil and Germany. On the other hand, the biggest coffee drinkers come from North of Europe as Finland, Norway and Danish. In comparison, the average consumption in Czech Republic is 4 kg per head and year. The largest exporters are Brazil, Colombia, Vietnam, Germany, Peru and Indonesia. Germany is together with Belgium and Switzerland one of the largest re-exporters. The biggest importers are European Union, United States of America, Norway and Switzerland. The coffee market in influenced mainly by the big roaster corporations. It is known that the roasters have incredible influence in coffee market. Their share from final coffee price in retail shops reaches about 50 per cent, sometimes even more. They are powerful in supporting advantageous to them production of low quality coffee in poor mainly Asian countries. They are called the "Big Four". Its members are, for everybody well known, companies as Nestlé, Procter and Gamble, Mondeléz International (formerly Kraft Foods) and Hillshire Brands and D.E Master Blenders 1753 (formerly Sara Lee). Their behavior had a significant influence on the coffee crisis. Coffee is the most traded agricultural commodity and the fourth traded commodity in the world. Its prices are set at futures markets/ exchanges. Robusta is traded at NYSE LIFFE in London. Arabica is traded at ICE Futures U.S. in New York.

The practical part brings the analysis of global coffee chain and the estimation of future development of international coffee trade, which is confirmed by two set hypotheses. The global coffee chain includes all involved entities and it describes their roles and form of processed coffee in every stage of the chain. The important role of Fair Trade in the chain was also recorded. The work with the hypothesis brought new knowledge about the coffee development and its future perspectives. Calculation of coffee export development in next three years, based on linear trend function, was confirmed. The comparison of charts of nine selected both types coffee produced countries with the scientific studies of nine researchers finally confirmed the second hypotheses as well. All selected objectives in the diploma theses were fulfilled.

The work is creating the scope for new challenges and opportunities in studying global coffee trade deeply. The analyses of coffee added value in every stage of coffee value chain, for selected one or more countries, can be a great benefit. The more complex methods used in predicting the future could detect not only the short-term forecast, for 3-5 years forward, but also they could forecast more distant future, which is not so accurate in case of eased forecasting methods.

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9. Annexes

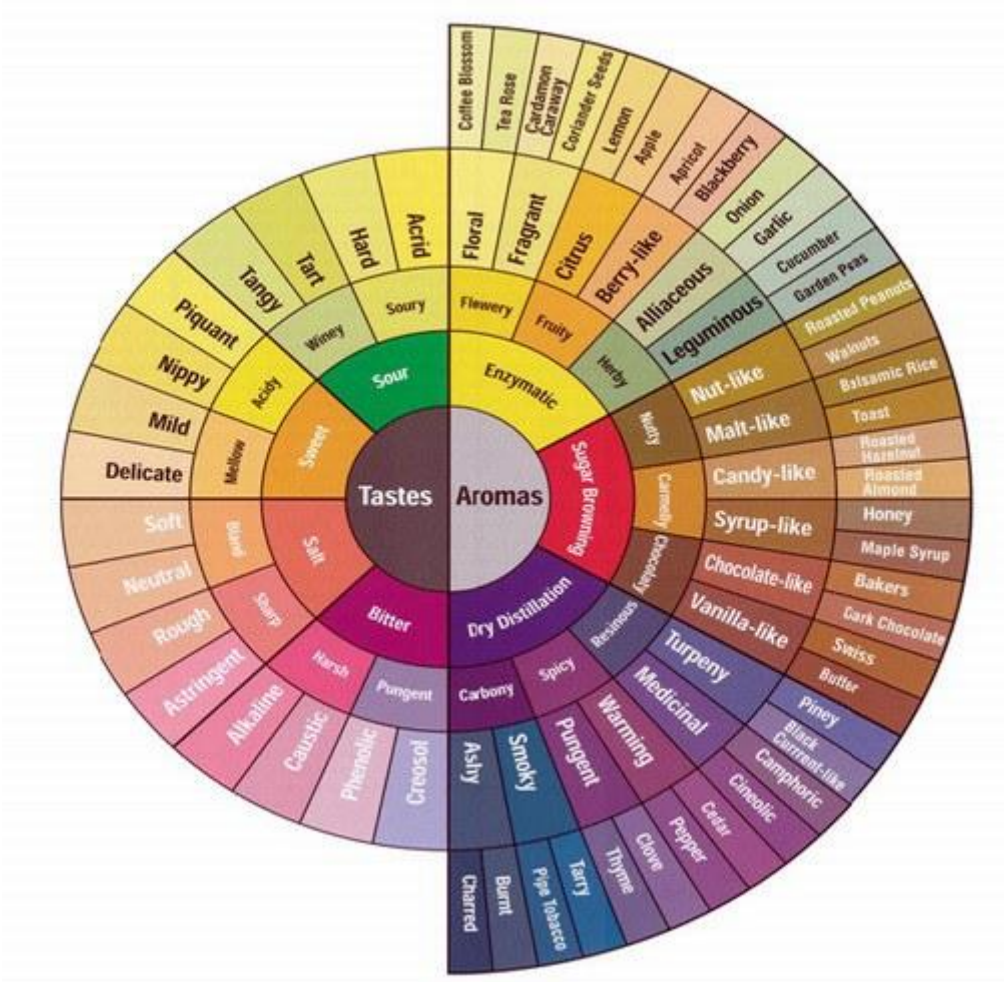


Figure 17 – Coffee tester (Source: The WCO – Supplier Indonesia Coffee, 2012)

Green unroasted coffee 0:00-75 f

Starting to pale 4:00 - 270 f

Early yellow stage 6:00 - 327 f

Yellow-Tan stage 6:30 - 345 f

Light Brown stage 8:00 - 370 f

Brown Stage 9:00 - 393 f

1st crack begins 9:20 - 401 f

1st crack under way 10:00 - 415 f

City roast: 1st crack finishes 10:40 - 426 f

City+ roast 11:05 435f

Full City roast: On the verge of 2nd crack 11:30 - 444 f

Full City+ roast: First audible snaps of 2nd crack 11:50 - 454 f

Vienna - Light French roast: 2nd crack is under way 12:15 - 465 f

Full French roast: 2nd crack is very rapid, nearing its end 12:40 - 474 f

Fully carbonized: Some call this Italian or Spanish roast, an insult to either! 13:00 - 486 f

Imminent fire ... 13:30 - 497 f

Figure 18 - Degrees of coffee roast process (Source: Coffee shrub, 2013)

Table 7 – ICO indicator prices, annual and monthly averages: 1998 to 2013 (Source of data: ICO, 2013)

US cents per pound (lb)

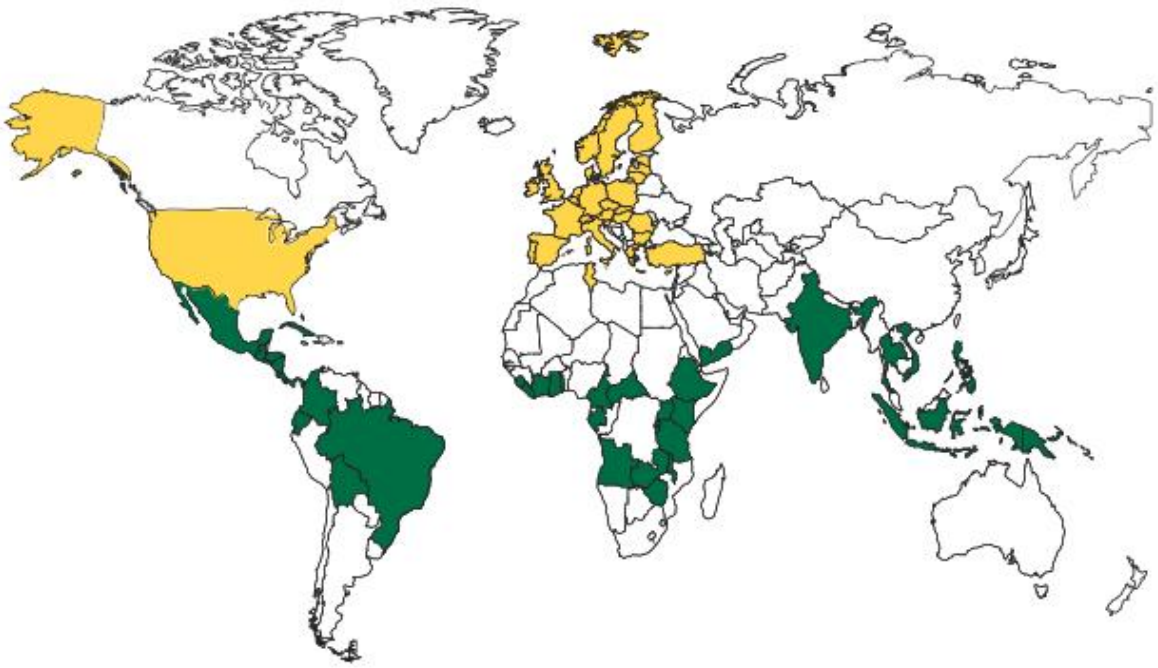
Annual/ monthly averages	ICO Composite price	Colombian Mild Arabicas			Other Mild Arabicas			Brazilian Natural Arabicas			Robustas		
		Market		Daily weighted average	Market		Daily weighted average	Market		Daily weighted average	Market		Daily weighted average
		New York	Germany		New York	Germany		New York	Germany		New York	France	
1998	108.95	142.83	145.58	142.83	132.25	144.09	135.23	121.81	130.80	121.81	83.93	80.81	82.67
1999	85.71	116.45	114.17	116.45	101.54	110.87	103.90	88.84	94.17	88.84	67.64	67.23	67.53
2000	64.24	102.60	99.80	102.60	85.09	92.89	87.07	79.86	83.67	79.86	42.12	40.36	41.41
2001	45.59	72.22	68.24	72.05	61.94	63.14	62.28	50.52	52.42	50.70	27.30	27.49	27.54
2002	47.74	65.26	64.78	64.90	60.43	62.31	61.52	45.09	45.92	45.23	30.83	29.76	30.01
2003	51.90	67.31	64.34	65.33	64.08	64.30	64.20	50.82	50.16	50.31	38.39	36.50	36.95
2004	62.15	84.15	79.49	81.44	80.15	80.64	80.47	68.18	69.11	68.97	37.28	35.65	35.99
2005	89.36	117.02	114.67	115.73	114.30	115.22	114.86	101.36	102.49	102.29	53.37	49.87	50.55
2006	95.75	118.36	115.70	116.80	113.95	114.80	114.40	102.89	104.19	103.92	70.28	66.98	67.55
2007	107.68	126.74	124.70	125.57	123.20	123.81	123.55	110.72	112.06	111.79	88.29	86.29	86.60
2008	124.25	145.85	143.12	144.32	138.32	140.86	139.78	122.51	127.86	126.59	106.31	105.03	105.28
2009	115.67	180.87	174.58	177.43	141.65	145.48	143.84	111.39	116.55	115.33	77.16	74.02	74.58
2010	147.24	223.76	226.22	225.46	194.40	196.63	195.96	145.71	155.93	153.68	84.09	77.63	78.74
January	126.85	214.55	201.65	207.51	154.40	161.92	158.90	128.11	132.75	131.67	75.09	69.05	70.08
February	123.37	208.36	201.89	204.71	155.92	159.00	157.86	121.61	125.42	124.57	73.49	66.74	67.88
March	125.30	206.37	205.17	205.71	162.13	166.09	164.50	125.28	126.49	126.21	72.53	66.16	67.25
April	126.89	195.18	203.50	199.50	171.32	167.95	169.24	124.94	126.04	125.71	76.26	70.55	71.52
May	128.10	197.76	202.39	200.33	174.21	172.72	173.28	121.66	129.19	127.32	76.21	69.49	70.61
June	142.20	229.06	220.75	224.49	193.52	189.16	190.90	136.18	145.29	143.20	82.51	75.78	76.92
July	153.41	230.88	239.33	235.52	205.25	201.94	203.21	146.74	159.92	156.87	89.95	84.28	85.27
August	157.46	241.77	245.79	243.98	212.80	210.78	211.59	152.91	166.28	163.21	89.06	81.38	82.68
September	163.61	239.26	254.34	247.77	222.10	223.09	222.71	162.02	179.06	175.15	87.11	80.16	81.28
October	161.56	225.83	233.45	230.02	215.84	218.84	217.64	163.86	178.82	175.38	90.57	84.18	85.27
November	173.90	239.59	247.86	244.02	227.96	237.29	233.48	179.16	194.16	190.62	97.94	90.79	92.04
December	184.26	256.52	258.50	261.97	237.33	250.75	248.17	186.05	207.74	204.25	98.32	92.97	94.09
2011	210.39	283.82	283.67	283.84	273.20	269.55	271.07	243.67	248.72	247.62	115.99	107.91	109.21
January	197.35	280.05	279.34	279.88	262.94	264.36	263.77	209.26	222.92	219.77	106.03	100.07	101.09
February	216.03	289.49	301.88	296.44	288.08	287.31	287.89	237.43	249.67	247.00	114.62	108.22	109.35
March	224.33	300.93	300.46	300.68	294.48	290.46	292.07	257.24	262.17	260.98	122.46	117.31	118.13
April	231.24	314.26	311.45	312.95	303.59	297.22	300.12	271.39	273.43	273.40	121.55	116.62	117.37
May	227.97	301.48	303.16	302.17	293.06	290.11	291.09	266.02	269.63	268.66	126.30	121.14	121.98
June	215.58	290.19	285.68	287.95	277.78	272.32	274.98	247.19	250.89	250.59	122.15	117.01	117.95
July	210.36	286.46	283.74	285.21	269.18	266.87	268.02	242.66	246.48	245.69	116.58	111.91	112.73
August	212.19	288.43	285.72	286.97	273.54	268.37	270.44	251.78	249.22	249.83	119.00	110.75	112.07
September	213.04	283.51	289.86	287.54	274.38	274.40	274.88	251.70	256.57	255.64	113.47	104.63	106.06
October	193.90	256.86	258.34	257.66	248.49	247.38	247.82	230.62	235.44	234.28	107.34	96.34	98.10
November	193.66	259.74	254.51	256.99	249.50	241.98	245.09	233.13	237.82	236.75	108.18	95.13	97.24
December	189.02	254.41	249.88	251.60	243.40	233.76	236.71	225.59	230.44	228.79	114.23	95.81	98.41
2012	156.34	203.88	200.47	202.08	187.52	185.70	186.47	171.30	176.07	174.97	110.64	101.36	102.82
January	188.90	258.70	253.68	255.91	239.43	235.66	237.21	222.41	230.02	228.21	109.40	94.32	96.72
February	182.29	248.09	241.07	244.14	225.49	223.50	224.16	211.95	216.58	215.40	111.25	100.21	101.93
March	167.77	224.69	221.25	222.84	201.85	200.86	201.26	188.15	193.26	192.03	113.60	101.66	103.57
April	160.46	215.85	213.18	214.46	193.35	190.06	191.45	177.20	182.10	180.90	111.71	99.94	101.80
May	157.68	207.66	206.27	207.32	186.35	182.74	184.65	170.39	174.67	174.17	116.01	105.35	106.88
June	145.31	184.45	184.85	184.67	169.79	167.96	168.69	151.55	157.64	156.17	113.34	104.24	105.70
July	159.07	203.31	201.93	202.56	190.77	190.26	190.45	171.69	177.33	175.98	113.37	105.87	107.06
August	148.50	189.27	185.32	187.14	175.97	174.07	174.82	158.75	160.46	160.05	113.01	105.28	106.52
September	151.28	191.54	189.02	190.10	179.60	178.79	178.98	162.59	167.87	166.53	110.87	103.83	104.95
October	147.12	182.73	180.36	181.39	172.37	174.06	173.32	155.77	162.96	161.20	109.89	103.45	104.47
November	136.35	172.55	167.99	170.08	160.64	159.49	159.91	146.35	148.87	148.25	102.94	96.72	97.67
December	131.31	167.67	160.75	164.40	154.65	150.92	152.74	138.80	141.07	140.69	102.26	95.39	96.59
2013													
January	135.38	170.64	167.76	169.19	158.27	156.47	157.29	139.36	146.94	145.17	105.79	98.52	99.69
February	131.51	164.74	159.20	161.70	153.00	147.23	149.46	133.37	137.72	136.63	109.70	102.97	104.03
March	131.38	163.46	159.89	161.53	152.96	147.67	149.78	129.74	134.83	133.61	112.47	105.08	106.26

Table 8 – International Coffee Agreement, status at 2012 (Source of data: ICO, 2013)

EXPORTING MEMBERS (38)	DATE OF DEPOSIT
Angola	22 September 2009
Bolivia, Plurinational State of	10 April 2012
Brazil	2 February 2011
Burundi	21 September 2009
Cameroon	17 September 2012
Central African Republic	24 August 2010
Colombia	2 December 2008
Costa Rica	11 December 2009
Côte d'Ivoire	15 October 2008
Cuba	4 December 2008
Ecuador	30 September 2008
El Salvador	4 December 2008
Ethiopia	8 July 2010
Gabon	25 February 2009
Ghana	17 August 2009
Guatemala	23 March 2011
Honduras	7 June 2010
India	22 September 2008
Indonesia	5 February 2009
Kenya	22 May 2008
Liberia	6 October 2009
Malawi	18 July 2012
Mexico	8 April 2010
Nicaragua	12 August 2009
Panama	12 March 2009
Papua New Guinea	6 November 2009
Philippines	29 March 2011
Rwanda	17 May 2012
Sierra Leone	5 May 2011
Tanzania	21 September 2010
Thailand	4 August 2009
Timor-Leste	5 January 2009
Togo	21 September 2010
Uganda	1 March 2010
Vietnam	28 August 2008
Yemen	14 July 2010
Zambia	3 August 2011
Zimbabwe	24 May 2012

IMPORTING MEMBERS (6)	DATE OF DEPOSIT
European Union	17 June 2008
Norway	21 September 2010
Switzerland	11 September 2009
Tunisia	21 September 2010
Turkey	28 March 2011
United States of America	28 August 2008

SIGNATORY GOVERNMENTS	DATE OF SIGNATURE
Benin	23 September 2009
Congo, Democratic Rep. of	23 September 2009
Guinea	2 July 2008
Madagascar	25 September 2009
Nigeria	21 July 2008
Paraguay	27 September 2010



Exporting Countries

Angola - Bolivia - Brazil - Burundi - Cameroon - Central African Republic - Colombia
Costa Rica - Côte d'Ivoire - Cuba - Ecuador - El Salvador - Ethiopia - Gabon - Ghana
Guatemala - Honduras - India - Indonesia - Kenya - Liberia - Malawi
Mexico - Nicaragua - Panama - Papua New Guinea - Philippines
Rwanda - Sierra Leone - Tanzania - Thailand - Timor-Leste
Togo - Uganda - Vietnam - Yemen - Zambia - Zimbabwe

Importing Countries

European Union (Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark,
Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy,
Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland,
Portugal, Romania, Slovakia, Slovenia, Spain, Sweden,
United Kingdom) - Norway - Switzerland - Tunisia
Turkey - United States of America

Figure 19 – ICA members (Source: ICO, 2013)

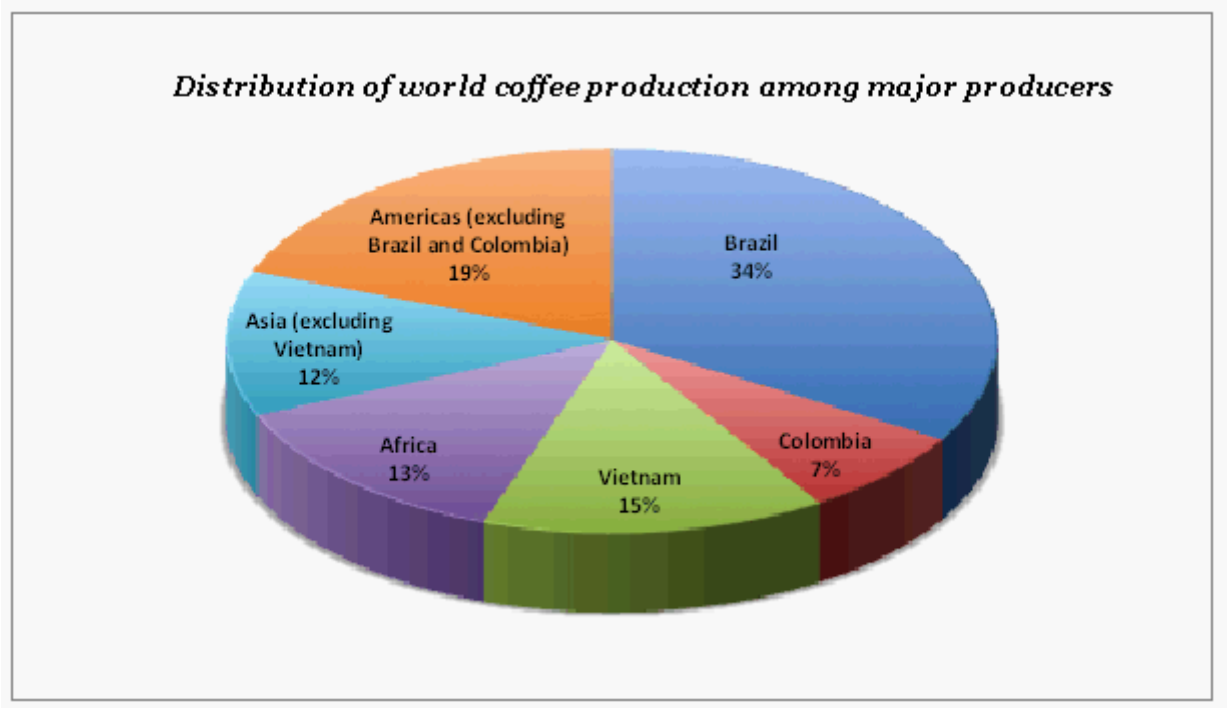
Table 9 – Countries by commodity, coffee – green by quantity (Source of data: FAOSTAT, 2013)

Rank	Area	Production (Int $1000)	Flag	Production (MT)	Flag
1	Brazil	2901244	*	2700440	
2	Viet Nam	1254745	*	1167900	
3	Indonesia	681144	*	634000	
4	Colombia	502929	*	468120	
5	Ethiopia	398124	*	370569	
6	Peru	336969	*	313647	
7	India	324456	*	302000	
8	Honduras	303357	*	282361	
9	Guatemala	260896	*	242839	
10	Mexico	254683	*	237056	
11	Uganda	205601	*	191371	
12	Nicaragua	111372	*	103664	
13	Côte d'Ivoire	110146	*	102523	Im
14	Costa Rica	107338	*	99909	
15	Philippines	95108	*	88526	
16	El Salvador	88199	*	82095	
17	Cameroon	75205	*	70000	F
18	Venezuela (Bolivarian Republic of)	74279	*	69138	Im
19	United Republic of Tanzania	65079	*	60575	
20	Madagascar	56740	*	52813	Im

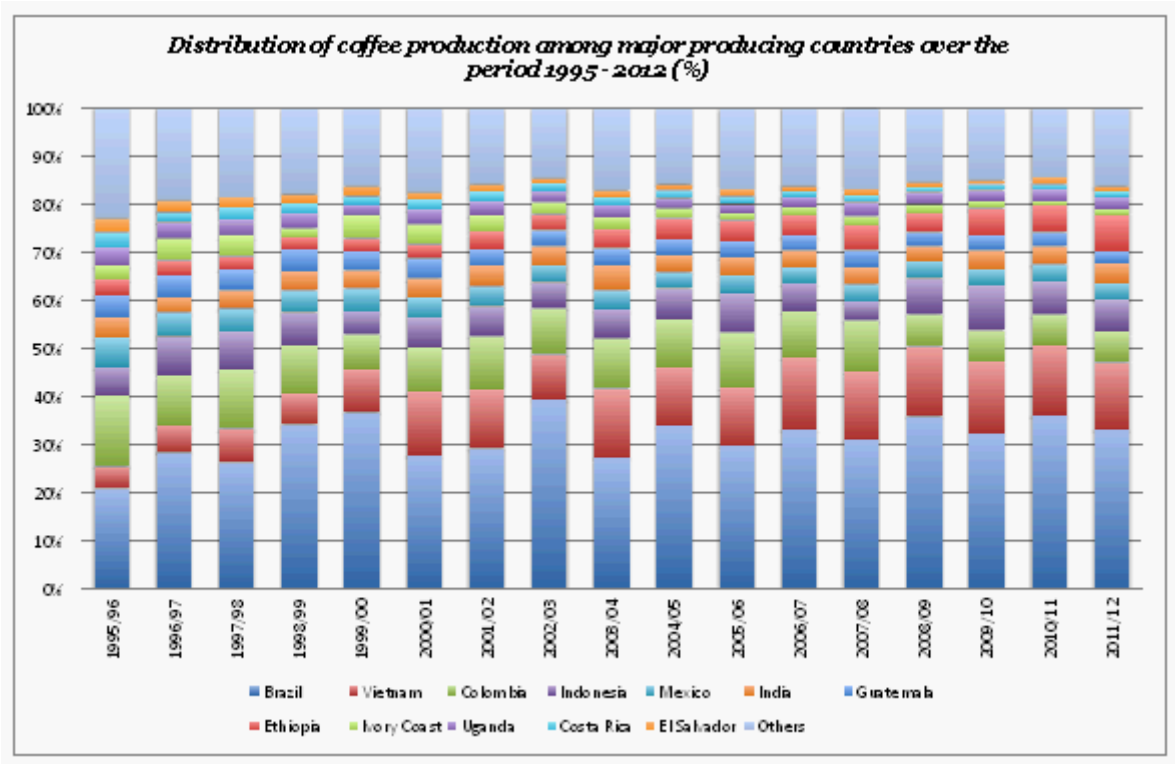
Table 10– Countries by commodity, coffee – green by value (Source of data: FAOSTAT, 2013)

Rank	Area	Production (Int $1000)	Flag	Production (MT)	Flag
1	Brazil	2901244	*	2700440	
2	Viet Nam	1254745	*	1167900	
3	Indonesia	681144	*	634000	
4	Colombia	502929	*	468120	
5	Ethiopia	398124	*	370569	
6	Peru	336969	*	313647	
7	India	324456	*	302000	
8	Honduras	303357	*	282361	
9	Guatemala	260896	*	242839	
10	Mexico	254683	*	237056	
11	Uganda	205601	*	191371	
12	Nicaragua	111372	*	103664	
13	Côte d'Ivoire	110146	*	102523	Im
14	Costa Rica	107338	*	99909	
15	Philippines	95108	*	88526	
16	El Salvador	88199	*	82095	
17	Cameroon	75205	*	70000	F
18	Venezuela (Bolivarian Republic of)	74279	*	69138	Im
19	United Republic of Tanzania	65079	*	60575	
20	Madagascar	56740	*	52813	Im

Graph 25- Average distribution of major producers in 2007-2012 (Source of data: UNCTAD, 2012)



Graph 26– Distribution of coffee production 1995-2012 (Source of data: UNCTAD, 2012)



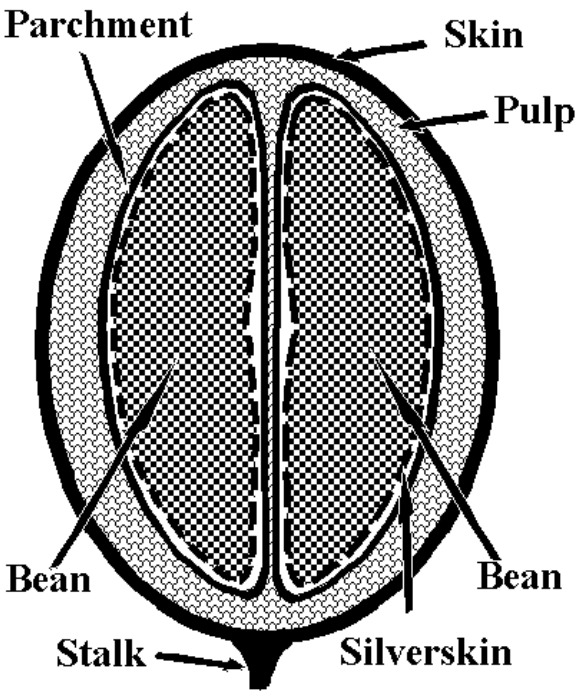


Figure 20 – Cross-section of coffee cherry (Source: Certified Organic Skins, 2013)