

## CHAPTER IV

### COFFEE PROCESSING SYSTEM IN THE CENTRAL HIGHLANDS, VIETNAM

#### 4.1 Overview of coffee processing

##### 4.1.1 Coffee processing methods

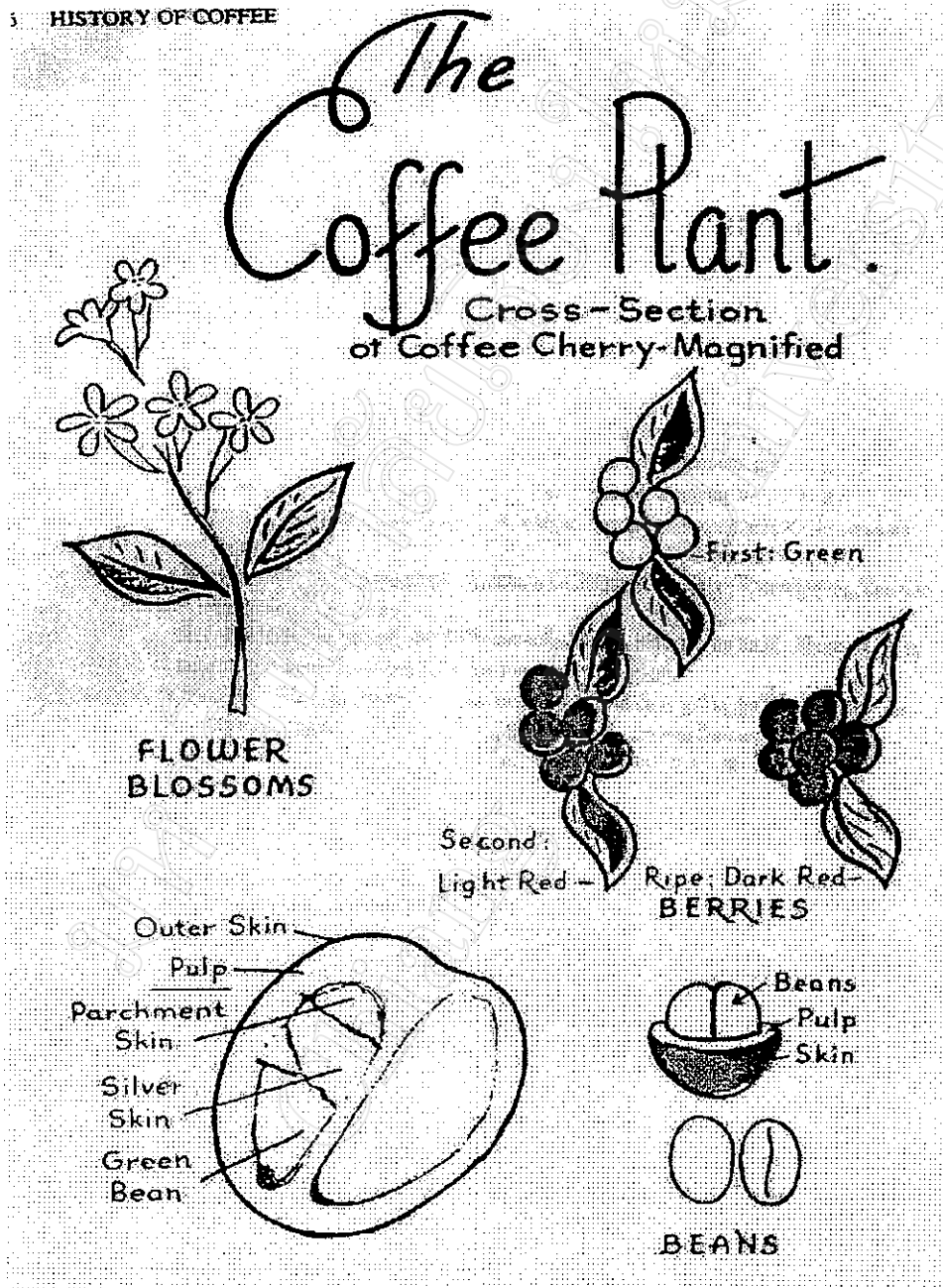
It would be difficult to provide a concise and up-to-date global view of all the precise green bean processes in use. Nevertheless, this chapter will provide an overall outline of green bean coffee processing system in the Central Highlands of Vietnam.

Coffee beans are the seeds of fruit botanically a drupe, but often called fruits or in the coffee trade “cherry”. It has a red skin (the exocarp) when ripe. Beneath the pulp (mesocarp), a parchment covering (the endocarp) surrounds the two seeds lying flat sided together. When the fruit is ripe, a thin and slimy layer of mucilage surrounds the parchment. Underneath the parchment the beans are covered in another thinner membrane namely the silver skin (the seed coat). Each fruit generally contains two-coffee seeds bean (Figure 4.1). If there is only one the fruit assumes a rounder shape and is known as a “pea-berry”. Coffee beans must be removed from the fruit and dried before they can be roasted, It can be done in two ways known as the dry and the wet methods. After the final processing stage the unroasted coffee beans are known as green bean coffee.

##### 4.1.1.1 Dried processing method

The dry method, also called the natural method, is the oldest, simplest, and requires little machinery or equipment. The method involves drying the whole fruits.

There are variations on how the process is carried out, depending on the size of the plantation, the available processing facilities and the final quality desired. The three basic steps such as cleaning, drying and hulling, are described below.



Source: Micheal et. Al., 1979

Figure 4.1 Sectional view of a coffee fruits

Firstly, the harvested fruits are usually sorted and cleaned to separate the unripe, overripe, and damaged fruits and to remove dirt, soil, twigs and leaves. Winnowing can do this, which is commonly done by hand, using a large sieve. Any undesired fruits or other materials, which is not winnowed away, can be picked out from the sieve. The ripe fruits can also be separated by flotation in washing channels close to the drying areas.

The coffee fruits are spread out in the sun, either on large concrete or brick patios or on matting raised to waist height on trestles. As the fruits dry, they are raked or turned by hand to ensure even drying. It may take up to 4 weeks before the fruits are dried to the optimum 12% moisture content, depending on weather conditions. On larger plantations, drying machines are sometimes used to speed up the process after the coffee fruits have been pre-dried in the sun for a few days. Hence, speedy processing is highly desirable in order to obtain maximum quality. Speed is accomplished by organization planning, training, and discipline in the laborers, and by having reliable and well-maintained equipment of ample capacity to meet peak loads. Machine drying of coffee fruits is particularly used in Brazil, but also in larger installations in Africa for total or finish drying (Cliford and Willson 1985). A comparison of machine-dried with sun-dried Brazilian coffee was reported by Teixeira (1982), who showed the importance of keeping the air drying temperature down to 30° C to minimize the incidence of defective beans, including "blacks".

The drying operation is the most important stage of the process since it affects the final quality of the green coffee. Over dried coffee fruits will become brittle and produce too many broken beans during hulling. Broken beans are considered defective beans. Coffee fruits that have not been dried sufficiently will be too moist and prone to rapid deterioration due to the attack of fungi and bacteria.

The dried fruits are stored in bulk of special silos until they are sent to the mill where hulling, sorting, grading and bagging take place. All the outer layers of the dried fruits are removed in one step by a hulling machine.

According to Clarke (1985) the dry method is used for processing about 95 % of the arabica coffee produced in Brazil. It is also used in the preparation of robusta coffee in most parts of the world where it is produced. Thus, almost all robusta are processed by this method. It is not practical in very rainy regions, where the air humidity is too high and rainfall frequent during harvesting.

#### **4.1.1.2 Wet processing method**

The wet method requires specific equipment and substantial quantities of water. If this method is applied appropriately the intrinsic qualities of coffee beans are better preserved to produce green coffee. The product from this method is homogeneous and has few defective beans. The coffee produced by this method usually has better quality and yields higher prices.

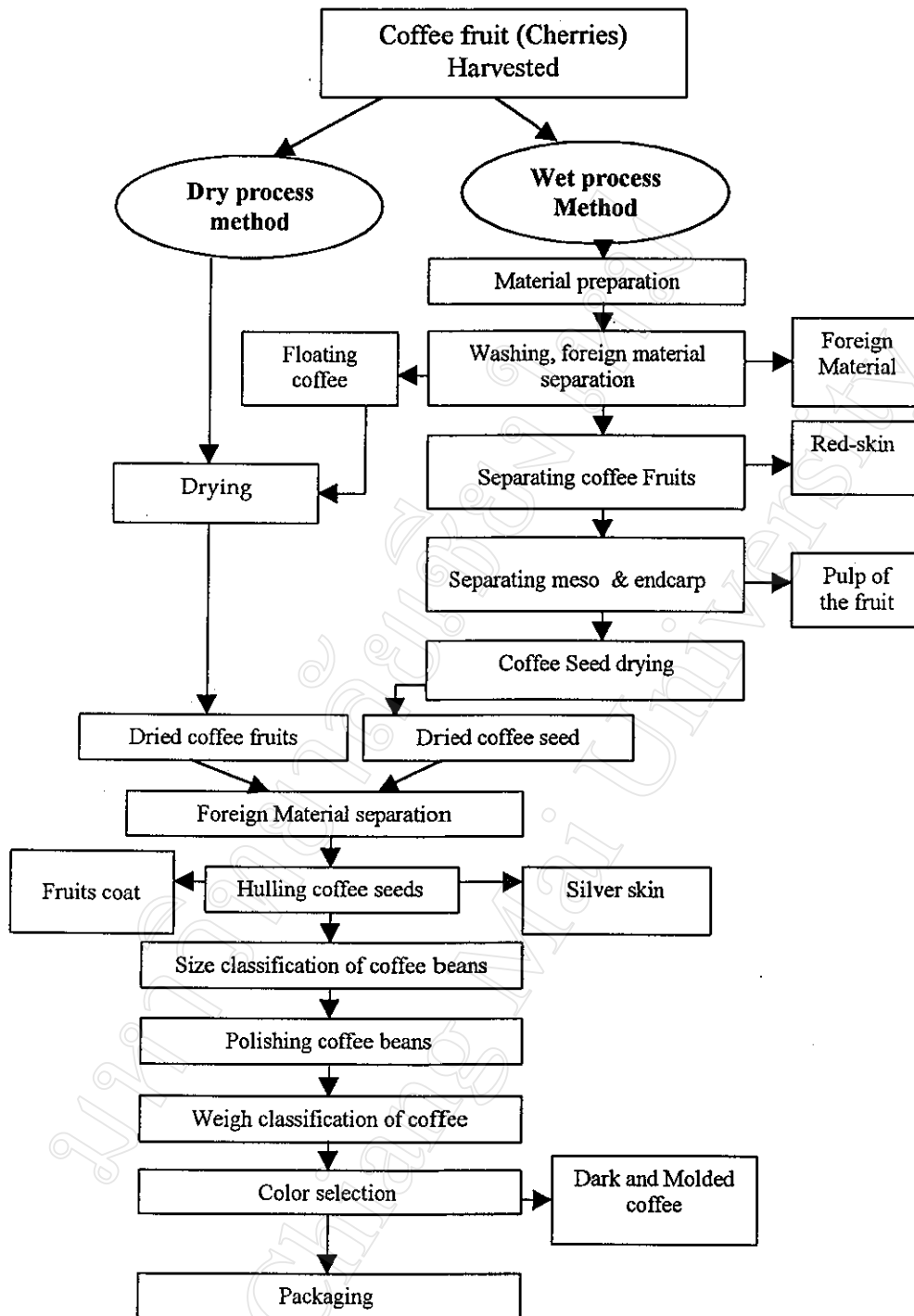
Even after careful harvesting, a certain number of partially dried and unripe fruits, as well as some stones and dirt, will be still present among the ripe fruits. As in the dry method, preliminary sorting and cleaning of the fruits is necessary and should be done as soon as possible after harvesting (Figure 4.2). Washing the fruits in tanks filled with flowing water can do this operation. Screens may also be used to improve the separation between the ripe and unripe, large and small fruits.

After sorting and cleaning, the pulp is removed from the fruits. This stage is the key difference between the dry and the wet methods. In the wet method, the pulp of the fruit is separated from the beans before the drying stage. The pulping is done

by a machine, which squeezes the fruits between fixed and moving surfaces. The flesh and the skin of the fruit are left on one side and the beans enclosed in their mucilaginous parchment covering, on the other. The clearance between the surfaces is adjusted to avoid damage to the beans. The pulping operation should also be done as soon as possible after harvesting to avoid any deterioration of the fruit, which might affect the quality of the beans.

The pulped beans go on vibrating screens, which separate them from any unpulped or imperfectly pulped fruits as well as from any large pieces of pulp that might have passed through with them. From the screens, the separated pulped beans pass through water-washing channels where a further flotation separation takes place before they are sent to the next stage.

Because the pulping is done by mechanical means, it normally leaves some residual flesh and the sticky mucilage adhering to the parchment surrounding the beans. This has to be completely removed to avoid contamination of the coffee beans by products resulting from the degradation of the mucilage. The pulped seeds are placed in large fermentation tanks in which the mucilage is broken down by natural enzymes until it is dispersible, and can then be washed away. Unless the fermentation is carefully monitored, the coffee can acquire undesirable and sour flavors. For most coffees, mucilage removal requires from 24 to 36 hours, depending on the temperature, thickness of the mucilage layer, and concentration of the enzymes. The end of the fermentation is assessed by feel as the parchment surrounding the beans loses its slimy texture and acquires a rougher "pebbly" feel.



Source: VNACAFE, 1998

Figure 4.2 Primary Coffee Processing in Central Highland of Vietnam, 1998

When the fermentation is complete, the coffee seeds are thoroughly washed in clean water tanks or in special washing machines. The wet parchment coffee at this stage consists of approximately 57% moisture (VINACEFE, 1997).

In order to reduce the moisture to an optimum 12%, the parchment coffee is dried either in the sunshine, in a mechanical dryer, or by a combination of the two ways. Sun drying is done on extensive flat concrete or brick areas known as patios or on tables made of fine-mesh wire netting. Coffee seeds are laid out in a layer of 2 to 10 cm thick and turned frequently to ensure even drying. Sun drying should take from 8 to 10 days depending upon ambient temperature and humidity. Coffee seeds dry more quickly if they are raised on tables because of better air circulation. The use of hot-air drying machines often becomes necessary to speed up the process in large plantations at the peak of the harvesting period when there might be more coffee seeds that can be effectively dried on the terraces. This process must be carefully controlled to achieve satisfactory and economical drying without any damage to quality. After drying, the wet-processed coffee seeds or parchment coffee is stored and remained in this form until the time before export.

The final stages of the coffee preparation is known as 'curing' and usually takes place at a special plant just before the coffee is sold for export. The coffee seeds are hulled to remove the parchment then passed through a number of cleaning, screening, sorting, and grading operations, which often occur in both wet- and dry-processed coffee. Electronic sorting machines may be used to remove defective beans including those known as 'stinkers', which cannot be distinguished by eye. The wet method is generally used for all the arabica coffees with the exception of those produced in Brazil and the arabica-producing countries (Michael *et al.*, 1979).

Apart from the two popular methods as described above, there is one method called the Aquapuler method. This method is used at some big farms and coffee processing firms which lack of modern machines for using wet processing and lack of patios for drying coffee. This method has some advantages such as saved time for drying, and saved surface of yard for drying by sun. The full process of this was summarized by Niwat Im Ong (1986). Coffee berries are pulped and cleaned with a

large amount of water. The parchment coffee is not treated by fermentation but goes directly for the drying process. Drying is done by machines, which uses little time and has no negative effects on the seed quality. This method is considered highly efficient in time and space to handle large volumes of seeds that commercial plantations get each region. Aquapuler method is not popular in the Central Highlands of Vietnam.

The steps involved in coffee-fruits processing and the various by-products of wet and dried methods are summarized in the Figure 4.3.

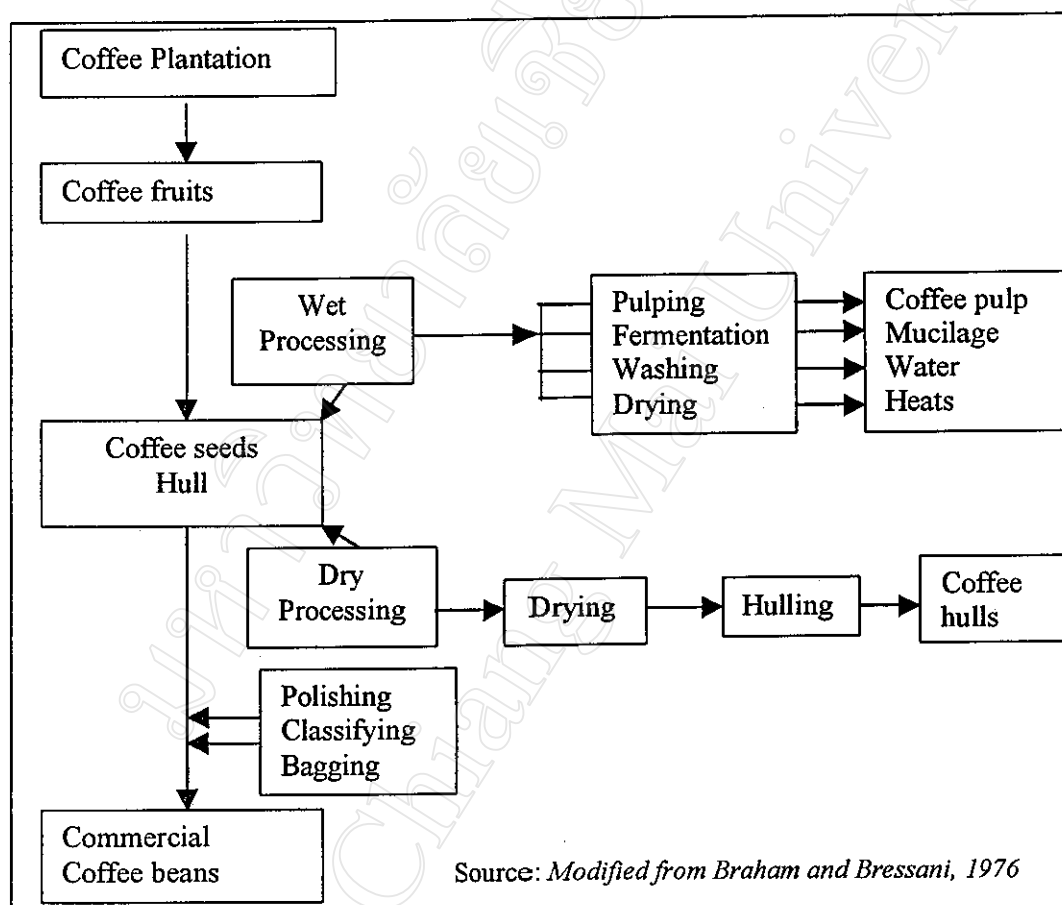


Figure 4.3 Steps involved in coffee fruits processing showing the various by-products that are produced.



When comparing the relative processing costs between the two methods, Micheal *et al.* (1979) revealed that the natural (dried method), *i.e.*, coffee process is inherently cheaper than washing process because it is simpler, and requires less labor and machinery.

In general, it is difficult to obtain the best quality for natural coffee. Too many conditions which are difficult to control, tend to result in mediocre grades, while there is always a risk of getting a very poor quality. Usually, natural coffee costs less to produce. The production of washed coffee from ripe fruits (wet method) may be easily kept under tight quality control in a properly organized operation. The most difficult step is obtaining a high quality of ripe fruit at the start. Poor processing methods will also result in poor washed method products.

#### **4.1.2 Quality of Vietnamese coffee**

According Michael (1963), the quality of coffee depends on the type of coffee variety, geographical source, altitude of growth, quality of processing of green beans (fermentation, drying, cleaning, grading, and storage), age of coffee trees, purity (free from foreign matter), bean size, and moisture content. The quality of coffee thus depends on the entire production and post-harvest technologies. For green bean coffee importers, quality is evaluated according to the size of the coffee beans, the color and amount of broken beans.

For export, Vina Control (one of the national quality control companies) requires coffee producers to classify its products according to three grades: R1, R2A, and R2B (Table 4.1).

Table 4. 1: Quality classification of green bean coffee for export, in Vietnam, 1998

Grade	R1	R2A	R2B
Seed moisture (%)	12.5	13	13
Broken seeds (%)	3.0	5.0	8.0
Extraneous matter (%)	0.5	1.0	1.0
Exelsa (%)	1.0	1.0	1.0
Size (%)	95 above 6 mm sieve	90-95 above 5 mm sieve	90-95 above 5 mm sieve

Source: *Vina Control 1998*

Table 4.1 shows that the quality of green bean coffee is different depend on 5 main parameters. Different grades of coffee depend on the levels of these factors. For example, three coffee grade are required a proportion of *exelsa*, (one kind of low quality coffee varieties which grown in the Central Highlands before 1970), is less than or equal to 1.0 %. The difference depends on other indicators such as the percent of extraneous (foreign) matters, proportion of broken coffee beans, and moisture of green beans coffee. The R1 grade is best one because it is contains the lowest of these components, next is R2A and R2B grade). There are different standards of green bean coffee for exports depending on different markets (importers and exporters). Some markets and importers have strict standard regulations such as Singaporean markets or the coffee stock market in London, which divides green bean coffee in to six grades. Sometimes the R2B grade of Vietnamese coffee is considered equal to the sixth grade in the coffee stock market of London.

Because of poor quality management, only 22.10% of green coffee of Vietnam are graded R1. The price of one ton of R2 is often \$150 lower than R1 one (VINACAFE, 1997).

Importing nations pay much attention to the quality of green bean coffee because they recognize that the quality of green bean coffee is the major factor determining the quality of value added coffee (roasted or soluble).

#### 4.2 Coffee processing system in the Central Highlands, Vietnam

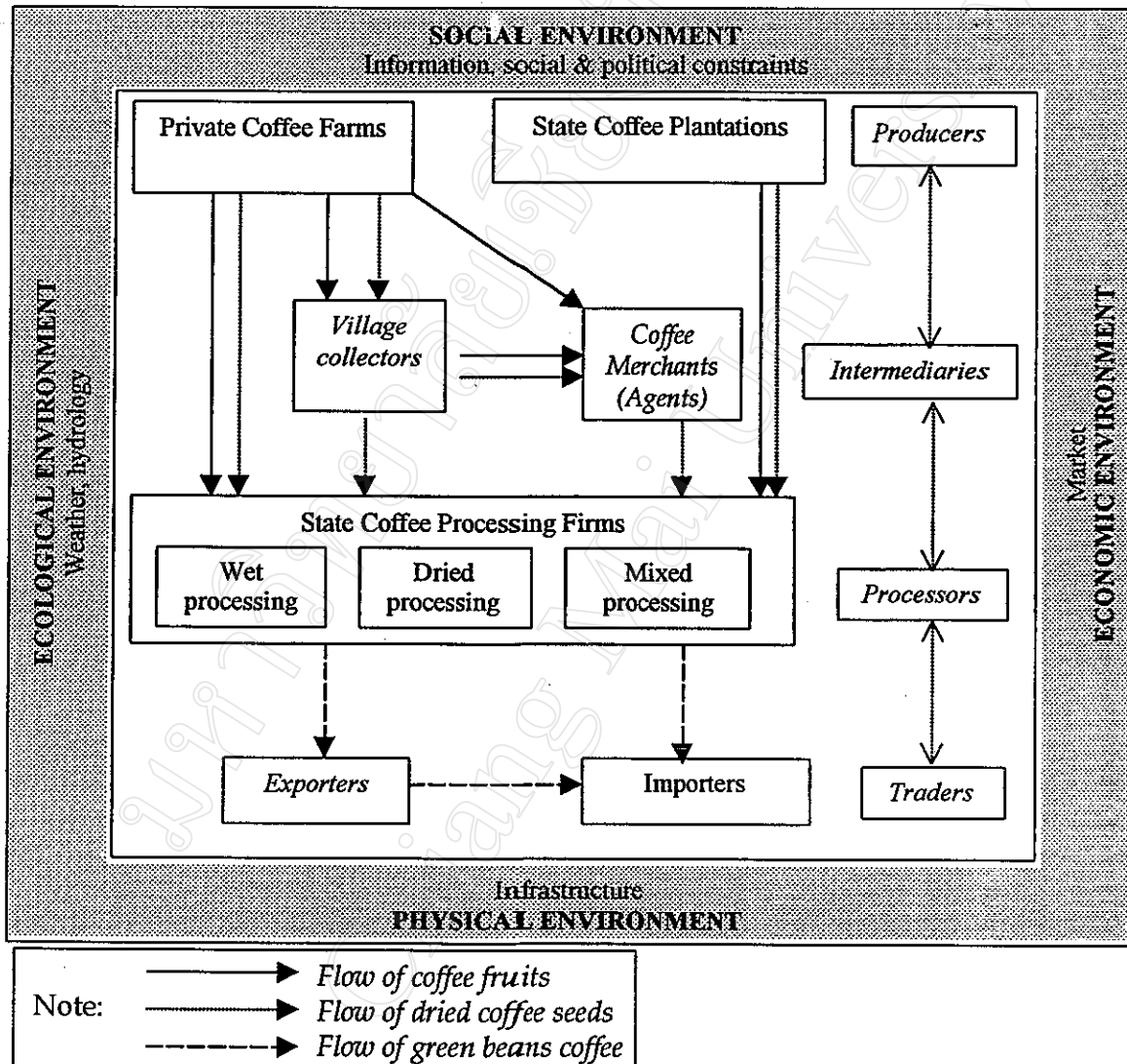


Figure 4.4 Coffee processing systems in the Central Highlands region.

The Figure 4.4 shows that there are six main agents involving in coffee processing systems in the Central Highlands of Vietnam. They are private coffee farms, state coffee plantations, coffee merchants, village collectors, state processing firms, and traders. These agents broadly fall under four distinct groups, viz.

producers, intermediaries, processors, and traders. They are having integrative relationship and affecting to each other.

#### **4.2.1 Private coffee farms and state coffee plantations**

Private coffee farms and state coffee plantations both produce fresh and dried coffee fruits. The size of private coffee farms range between 0.5-10 ha, while in the state coffee plantation is about 500-700 ha. According to an estimate of VINACAFE (1997), more than 70% of fruit coffee in the whole country is produced and dried on farms and then sold to collectors or coffee agents. These farms mainly practice primary processing (sun drying) with using small and simple machines for milling and sorting coffee fruits. The harvested fruits are usually sorted and cleaned, separating the unripe, overripe, and damaged fruits and to remove dirt, soil, twigs, and leaves. Then, the coffee fruits are spread out in the sun, either on large concrete or brick patios or on matting raised to waist height on trestles. The problem is that most farmers normally lack of money for purchasing coffee processing machines and lack of knowledge about the relationship between primary processing and the quality of exported coffee. It is a fact that during the harvest season some farmer dry their coffee anywhere so that the coffee fruits are mixed with a lot of debris or if the weather conditions are not good the coffee fruits are attacked by fungi and bacteria. Coffee storage is limited due to farmers' capital shortage, poor storage facilities and they may be risk associated. In order to achieve high quality coffee, we can not ignore the farmers' practices involving to the first stage of coffee processing as a vital component of the entire coffee processing system. However, on larger plantations, drying machine is sometimes used to speed up the processing after the coffee fruits has been pre-dried in the sun for a few days. So the farmers in state coffee plantations normally have more advantage in primary coffee processing in comparison with private households. There is further difference between private

households and the state plantation farmers. Coffee production households have rights to invest on their land and they can sell their coffee any time to any place when they want. Farmers in state coffee plantations, normally have closer relationships with their state plantation. This means that they have rights to receive some benefits from the state plantations such as land, money, and coffee varieties, but they have to sell their products to the state plantation according to a contract that they sign with each plantation. The surplus coffee products from their contracts can be sold to any one at different prices. They often sell their surplus coffee to state plantations or stock (or consign) them in the store of the state coffee processing plants and they will receive in advance 70% of existing price. They can sell these products to the state processing firms when they felt that the market price is high enough, at that time the farmers can receive a full payment. Interestingly, this kind of arrangement benefit both parties, on one hand, the state firms can save working capital in buying raw coffee materials from farmers because they can process these products and sell it at any time. On the other hand, the farmers can save on storage costs and don't have to worry about the quality of their coffee fruits. The state processing firms takes care of them. Therefore, the quality of coffee produced from farmers in state firms is higher than coffee produced from private households.

#### **4.2.2 Village collectors, coffee merchants and coffee agents**

Village collectors are closer to farmers than inter-village coffee merchants. Their relationships with farmers are not only personal relationship, but also in professional by providing better marketing services if required. Their buying activities are done directly with both farmers at farm gates and in the village markets. Especially buying in village markets, village collectors gain good position in price setting. This is a result from their permanent position in these markets versus contemporary visits by coffee merchants. In addition, it is not profitable for

merchants to come to village markets daily and handle small volumes by buying directly from farmers. Due to the limited working capital, village collectors can not keep dominant positions in village markets. Rather, they are often partly dependent on trading agreement with inter-village merchants.

Coffee merchants and coffee agents work as middlemen. They collect fresh coffee or dried coffee fruit from the farmers and then sell it to state coffee processing firms after sorting or hulling. Most coffee merchants and coffee agents have small-scale operations and they only have some small machines for simple processing, such as milling, drying, and primary sorting.

There are some differences between coffee merchants and coffee agents. Coffee merchants are people who do coffee business and profit from buying and selling coffee. Coffee agents are often partners of state coffee processing firms' network. These coffee agents use working capital from coffee processing plants for buying coffee fruits base on the price which is decided by state coffee processing plants at short notice e.g. within one day, a haft day, or even only within one hour. These prices depend on the market price at that time. Normally, coffee agents only have some small machines for simple processing, but they have higher skills on quality assessing and prices of coffee that they buy as well as having better storage facilities than coffee merchants.

#### **4.2.3 State coffee processing firms**

State processing firms have an important role in coffee processing systems in the Central Highlands. There are three types of state coffee processing firms: wet, dried, and mixed processing firms. These firms differ slightly in the scale of processing. Each wet-processing firm controls coffee planted area of 700-1000

hectares. The diameter of these areas is less than 50 km. Processing firms, therefore, can transport and process coffee fruits within 24 hours. Because the major technological differences between wet and dried processing methods are time limitation. Before building wet processing plants, it is necessary to consider location of coffee plantation so that they can collect enough coffee fruits for its operation capacity. These coffee processing plants also have to achieve the technological requirements of wet processing.

Most coffee goes to the state coffee processing firms where green bean coffee is made. After processing of green bean coffee, the state coffee processing firms either export directly to foreign importers or indirectly through domestic exporters.

#### **4.2.4 Other factors involved in coffee processing**

In the Central Highlands region, there are about 35 companies which to have rights to export coffee directly (VINACAFE, 1999). They are state coffee processing firms, export-import companies, and joint-ventures. Coffee processing firms can gain higher returns if they have the right to export coffee directly to world markets.

There were two joint-venture coffee processing firms each of which produces about 1000 tons of instant coffee per year.

Apart from the factors described above, there are four external factors affected the coffee processing systems, particularly to the economic efficiency of coffee processing firms. They include the social, economic, physical and ecological factors.

#### 4.2.4.1 Economic environment factor

World coffee market variable such as green bean coffee price and export quantity are also important factors which have effected coffee processing system in Central Highlands region. In this part some sub-factor that effected to coffee processing system in the Central Highlands region were summarized.

##### *a) Trends of the world coffee market opportunity and threats for the Vietnamese coffee industry*

The main characteristics of coffee production and consumption are fluctuation in production and prices. Ever since the coffee industry of Brazil became such an important factor in the world, there has been a long history of fluctuation in production and prices. Except for a very slow and steady rise in demand, accountable to increased population and similar causes, there has been little fluctuation in consumption. Indeed, consumption tends to be a little less during and following a period of high prices. According to Haarer (1962) though the reasons can be over-simplified, the chief causes of world surpluses for more than fifty years have been (a) period of intensive planting during world shortages and high prices, and then (b) a succession of good years and bumper crops in Brazil. The chief causes of high prices have been: (i) shortages caused by bad year in Brazil, i. e., widespread damage by severe frost or drought; and (ii) depression caused by periods of surplus supplies and low prices, leading to abandonment of marginal plantation, i.e.,. Those that can only remain profitable when the prices are moderate, causing a shortage due to decreased planting.

The output of Brazil tends to be unstabled recently because of losing crops caused by frost and drought (1994). This leads to sharply drop in supply and cause a



high fluctuation in coffee prices. The speculators have also contributed to the instability.

Since the devastating 1975-frost in Brazil, we have once again begun to see coffee becoming an important commodity for some of the South-East Asian countries (Bill Tan, 1988). Indonesia, prior to 1975 was producing about 200,000 tons, today it is producing about 480,000 tons, marking Indonesia the third largest coffee producer in the world, after Brazil and Colombia. Philippine in the pre-1975 period had production of about 30,000 tons, it is increased to 121,000 ton in 1997 (FAO, 1998).

According to UNCTAD/WTO (1996), Asia has become the world leading Robusta production area. Vietnam is now becomes the second largest Robusta production country in the world after Indonesia. Coffee outputs of Thailand and India have also increased and contributed significantly to the total quantity produced in this area.

*b) Competition among coffee exporters in the world market*

Since Vietnam is the second largest in producing robusta coffee, now it has a major position in the world green-coffee supply. It gives Vietnamese exporters a higher sale power and eliminates pressure from intermediaries, who cause selling coffee at lower prices as compared with world prices.

Arabica and robusta coffee are not perfect substitution. Robusta is commonly use as a very important blend to strengthen taste of coffee beverages. This is why the direct competitor of Vietnam is not Brazil but Indonesia. Recently, Vietnamese exporters have faced low competition in world markets because of crop losses in Indonesia and other South American countries.

Although Vietnam has become a member of ICO and ASEAN, Vietnamese exporters still use indirect export as a means to sell their coffee. This means that, they must sell at low price and have little control on the product eventually trademark. Vietnamese coffee, for example, is sold in Singapore, with a Singapore trademark. Vietnamese exporters still lack effort distribution systems of nation products in the world markets.

The competition among exporters in the world has become a large factor. It influenced directly or indirectly to the development of Vietnamese coffee industry in general and also in Vietnamese coffee processing firms in particularly.

*c) Vietnamese coffee market situation*

Before 1985 the main market for Vietnamese coffee was the USSR which had an unstable demand. Since 1991, Vietnam became a member of ICO so the world market has been opening for Vietnamese coffee. Singapore is the largest intermediate market which accounts for over 40% of total Vietnamese coffee exports (VINACAFE, 1999). Coffee exported to Singapore is labeled with the brand name of Singapore and re-exported. The price is much lower than the world price.

Recently, Vietnamese exporters have tried their best to find better markets for its product such as Germany, UK, and USA, which are direct-consumption markets. These are good outlets for the Vietnamese coffee industry. Vietnamese coffee exports to USA markets are still modest because of strict import quality requirements. This is the reason why Vietnamese producers should consider quality at a top priority for penetrating these potential markets.

The USA is the largest coffee market with a national population of above 250 millions. Annually, the USA market absorbs 23.99% of world's total imports. In 1997, the USA imported about 78 million bags of green coffee (ITC, 1998). International Trade Center (1991) indicated that in order to meet the US requirement, coffee must have three criteria:

1. To be free of unapproved pesticide residues,
2. To have no or only a limited exposure to insect infestation in the field, and
3. To be free of all chemicals and other contamination including molds or lives insects

Coffee that does not meet these requirements will be detained or sent back to the original countries. Green coffee may not be legally imported into the United States unless it complies with specific regulations of the FDA and the Environment Protection Agency. These regulations specify quantitative limitation on the presence of such contaminates i.g. insects, bird excreta, and pesticide residues. All individuals or firms involved in growing, exporting, transportation, importing, storage, and processing green coffee must understand that acceptable import of green coffee into the United States is essential with their long -term business with the USA.

With these strict import requirements on green coffee quality, Vietnamese firms using intensive plant-protection chemicals will face difficulties. In order not to violate these regulations, these firms must stop using chemical in production aim at improving the quality of their coffee processing systems so that they can maintain long term future markets for their coffee products.

#### **4.2.5 Social factors**

Social environment factors such as government policies, institutional organizations, infrastructure networks, and so on are very important for the smooth and viable existence of coffee processing systems.

Government policies on input subsidies, tax, export control, and management, as well as other related financial policies are given much attention in marketing studies, which have significant effects on marketing, structure, conduct and performance of coffee processing systems. As mentioned above, coffee processing firms require high capital and management investments. Hence, accessibility to credit as well as technological and marketing information is vital for the development and improvement of coffee processing systems.

If the Vietnamese government has effective policies to support to the coffee industry e.g. investment policies, export policies, and tax, so the coffee processing industry could improve its efficiency.

##### **4.2.5.1 Access to credit**

Most firms in this area needed to borrow money to operate coffee processing because they could not afford the high capital investment during renewing. The survey showed that firms could borrow money from government sources.

The data from survey shows that 86.7% of the all firms observed borrowed money from agricultural banks at an interest rate of 1.19 % per month. There are some other state organization e.g. commercial banks, and extension center lending 1.2% - 1.3% per month. It is still difficult for firms to obtain credit from these

organizations because of the higher interest rate and sophisticated procedure. However, Vietnam's credit policies have been positive changes. Before 1990 the production units had only a fixed amount of money for their production and business and all most of this money is short-term credit. But now every unit can borrow money from different banks and the time is fluctuates depend on the their production plans.

#### **4.2.5.2 Access to information**

There are many sources of information which are available to coffee processing firms both domestic and foreign sources. The survey results showed that mass media were common sources of information for firms concerned production technology and prices of coffee inputs and outputs. Firms in the study area had opportunity to access of new technologies through participation in training courses or conferences held by VICOFA, VINACAFE, or coffee clubs and the province's extension centers. The training courses were not organized regularly, so the main sources of information firms were still received from newspapers, magazines and radio. To get new and good information about the world coffee market, most of the coffee processing firms received information from foreign news such as Downjohn, Router. In the recent years processing firms can get information from Internet and the Internet price has been decreasing. Thus, coffee processing firms can access to the information, which relative to coffee processing technologies and world coffee prices. So that they could made their decision suitable with the market.

#### **4.2.6 Ecological and physical environment**

Ecological environment factors such, as quality of land, altitude, sunshine and hydrological has been was important factors that effected to the coffee output. . If there was bad weather for coffee development so the coffee production could be

low. On the other hand, some of the major and more frequent sources of contamination occur during the processing of the fruits until the green coffee was dried. The point is that most of the fruits coffee must be freed from the mucilage by fermentation, washing, and the drying in a very short time. If fermentation does not occur rapidly enough, fresh picked fruits must be held up longer than desirable until their fermentation is possible. This may result in a "wild ferment" in the piles of broken fruits. Thus, the ecological environment is not suitable for producing and processing coffee. This will be affected the price and supply of raw coffee which in turn effected to coffee processing firms. According to Daklak statistical department 1999 about 20% of coffee output of Daklak was lost during the bad weather in 1997-1998 crop. The other example is that the impact of the June 1994 frosts in Brazil (followed by an unseasonal spell of dry weather) on what had already become a volatile market was sudden and decisive.

Physical environment such as infrastructure: roads, market centers, transportation conditions, *i.e.* are conditions which influenced to coffee processing system. If the transportation was not good it can increase the transportation costs, and increase the marketing cost. This is reasoned of profit loss of coffee processing firms. The transportation situation in the Central Highlands region now is the major problem that many coffee producer and businessman considered. It is the fact that there is lack of good roads for transferring the coffee from the far are to the coffee processing firms or coffee agents. So that these coffee farms have to process coffee while some coffee processing firms have been still lack of raw coffee material input for their plants. This situation revealed that it need to consider when desiring and establishment the new processing plants.

#### **4.3 Summary of existing coffee processing system**

There were six main components involving in coffee processing system in Central Highlands of Vietnam. They are coffee farms, state coffee plantations, coffee merchants, village collectors and state processing firms and traders. These components broadly fall under four distinct groups as producers, intermediaries, processors and traders.

Coffee merchants were main actors in the village markets who collected small amount of coffee from farmers and sold to state coffee companies. However, the State Company was the largest individual producers and largest individual buyer and seller in the coffee market of this area.

The coffee processing firms were operating as one of the main component in coffee processing system in this area. The government policies and world coffee market have been strong affective to the coffee processing system of the Central Highlands region.