FINAL

ENHANCEMENT OF COFFEE QUALITY THROUGH PREVENTION OF MOULD FORMATION

Targeted Investigation of Robusta Coffee Processing and Marketing Chain in Lampung

NATIONAL CONSULTANT REPORT

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FOREWORD

This is the report of the social economic study of Term of Reference (TOR) No. GCP/INT/743/CFC entitled Enhancement of Coffee Quality through Prevention of Mould Formation. The activities and report was made under the supervision of the Food Quality and Standard Service, Food and Nutrition Division, FAO and in collaboration with national project staffs and *Centre de coopération internationale en recherche agronomique pour le développement* (CIRAD).

This socio economic report consisting of three studies, namely,

1. Targeted Investigation of Robusta Coffee Processing and Marketing Chain in Lampung;
2. Investigation of the Feasibility of Wet Processed Robusta by Smallholder farmers in East Java;
3. Targeted Study of the Coffee production Chain in North Sumatra Arabica (Mandheling Coffee).

This report is concerned about the first social-economic study, that is, **Targeted Investigation of Robusta Coffee Processing and Marketing Chain in Lampung.**

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Dr. Wayan R. Susila, APU.

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Background

Located in Ulu Belu Sub-district, Ngarip Village is one the villages in Lampung Province that has a significant share on coffee production with total production is around 836 tons per year. Moreover, coffee plays an important role in the village because more than 92 per cent of the farmers depending on coffee as the main source of their income, attaining to around 70 per cent of total income.

In contrast with its important role in the village, coffee quality produced in Ngarip is low. Although Nestle has introduced and supervised farmers in the village to improve their coffee farming, coffee quality, and income in the region are still low. This low coffee quality, together with low productivity, has caused Ngarip to be a poor village with average income around Rp 5.6 per household per year, below poverty line of Rp 6.4. The problems of low coffee quality can even depress coffee farmers in the future when the European Community (EC) imposed a tighter coffee quality related to OTA contaminations.

With this problems, there are three objectives of the study, namely, (i) to define, describe and verify the steps in main production and marketing systems in the region; (ii) to identify the constraints and opportunities to changing the systems in order to reduce the risk of OTA and poor quality; and (iii) to propose a set of conclusions on how to reduce the risk of OTA occurrence and improve the quality of coffee from Southern Sumatra. The research methods used in the study are descriptive methods (proportion, tabulation, margin analysis, and farm budgeting) and analytical methods (multiple regression analysis).

Situation Analysis

Farmers in Ngarip have around 1.4 ha of intercrop farming where coffee as the main crops and have a 0.25 ha of rice farming. Some farmers also rise cattle, mainly goats, cow, and chicken. In addition, some farmers earn some income from non-farm sector such as labor and transportation services. Beside to increase income, this system is very useful

to reduce technical and price risks. As coffee as the main crop, the main source of farm incomes comes from coffee, contributing to around 70 per cent of total income. The contribution of intercrops is relatively small (10%), while that from cattle are even smaller. Rice farming has small contribution to farm income because their productions are not sold to local market, but to fulfill household consumption.

Since most labors used are family labor, the family labor allocation is an important factor determining the performance of farming system and efforts to improve coffee quality. Between March to July and September can be considered as the busy months so that the family labor tends to be deficit at those periods. October to February can be perceived as the situation of family labor surplus.

There are four techniques of coffee processing in Ngarip, namely, traditional/Java, Semendo A, Semendo B, and Nestle. Java technique is the most common technique (68 per cent) applied in Ngarip because most coffee farmers in Ngarip are transmigrated from Java. In addition, around 90 per cent of farmers use non-selective technique or strip picking (*petik asalan*) in picking their coffee cherries. Except for Nestle technique, the coffee qualities are very low with 19.43 per cent of moisture content (MC) and coefficient of variation (CV) is round 13%. The average defect value is 210 with CV even higher of 92 per cent. For Nestle coffee, the MC is 12 per cent maximum and the defect value is maximum of 120.

Surprisingly, although the coffee processing techniques applied by farmers in Lampung are very risky to OTA contaminations; the results of analysis indicate that the OTA contaminations of coffee at farm level in the region are relatively low, below the limit applied of the EU (5 ppb). Based on 106 samples that re-grouped to be 20 samples, the average OTO contamination at farm level is 0.74 ppb; even 9 samples out of 20 has no OTA contamination (0 ppb). The maximum OTA contamination found in the coffee samples is 2.7 ppb. At trader level, the average OTA contamination is even lower, that is 0.36 ppb

In general, coffee marketing systems in Ngarip can be considered as a traditional marketing system, involving collectors, traders, and exporters. The total margin in collector, trader, and exporter are 13.6, 8.5, and 7.6 per cent respectively, while farm gate price is around 75.9%. If the farmers produce Nestle coffee, the farm gate prices are at least 81.2 per cent. There are two common payment systems, namely, cash and carry and

loan system. Loan system is the most common of repayment system that cause farmers has to sell their coffee to the collectors that give loan to them. Under this condition, bargaining position of farmers in term of price and quality is relatively low. In marketing jargon, this situation is called as an interlocked market.

Constraints and Opportunity

Based on farmers perspectives and regression analysis, there are some inter-related constrains and problems associated to the decreasing quality of coffee produced by the farmers, as follows.

1. *Technical barrier*. This constraint is mainly related to difficulties faced by the farmers to apply the improved techniques. Stated by 44% of farmers, this constraint is significant in inhibiting the farmers to conduct selective picking.
2. *Technical-production risks due to pests and thieves*. Although this is not a major constraint, about 29 per cent of farmers perceived that loss of production due to pest and thief is a major constraint. This is especially true for the coffee plantations that are relatively remote from the villages.
3. *Insufficient family labor*. This constraint has some facets including limitation availability of family labor, addition works for selective picking and processing technique, and inefficiency due to small economic of size. This constraint is very important factor, especially to prevent farmers (46 per cent) to apply a better processing and storing technique.
4. *Lack of capital and cash money*. Most farmers are poor implying that they do not have enough money to finance the application of better technology that requires a higher cost. Around 96 per cent of farmers stated this as a main constraint.
5. *Interlocked market*. Around 49 per cent of farmer stated that they are under interlocked market situation that inhibit farmers to improve coffee quality.
6. Insufficient price incentive for better coffee quality. Buyers (collectors, traders, or exporter), using some formula have given some price incentives to the farmers. However, the incentives are considered to be not sufficient, because the incentives only consider weight due to MC and non-coffee materials. The price incentives given by Nestle are higher than that by exporters. However, this price incentive is still considered to be insufficient to compensate the costs and risks incurred to

produce better coffee qualities. Around 78% of farmer stated that insufficient price incentive as an important constraint to produce better quality coffee.

7. Limitation of market size for higher coffee quality. Nestle has given price incentives for better coffee qualities; however, the total better quality coffee that can be absorbed by Nestle (production quota) is limited. For example, the production quota in 2004 was 3000 tons. Around 73 per cent of farmers stated that market size is one of major constraints in increasing production of better quality coffee.

Regression analysis shows that there are some factors that could effect to quality improvement in term of MC and defect. The believe of farmer that coffee farming and quality improvement could help farmer to achieve their desires/dream is one of the most important factors to improve coffee quality. The second factor that has a significant contribution to improvement of coffee quality is welfare level of the farmer. The higher their welfare level, the higher coffee quality produced. With lower degree of importance, some other factors, namely source of information, availability of family labor, have also some roles in determining coffee quality.

In term of defect value as an indicator of coffee quality, the participation of farmers in farmer's organization is a key factor. Another important factor is decision-making process of the farmers. The farmers that decide mostly their own decision or less interaction with others tend to produce higher defect value. From motivation aspect, the number of desires of farmer has also some contribution to improve coffee quality. The regression analysis also indicates that the welfare status of farmers is a determining factor. In addition, farmers' experience also has positive impact on defect value. The more experience the farmers, the less defect of their coffee.

Although some problems inhibit quality improvement, there are also some opportunities and avenues that can be used to improve the coffee qualities as described below.

1. *High motivation of most farmers*. The results of analysis indicate that motivations to achieve some desires play an important role in coffee quality improvement either in terms of MC or defect. The results of survey indicate that more than 96 cent of farmer still has some desires to be achieved.

2. *Believe on important role of coffee to achieve their desires.* Around 90 per cent of farmers believe that these desires can be achieved by improvement in their coffee farming and quality. The results of the analysis shows that this believes have a significant contribution to improve coffee quality.
3. *Good knowledge of coffee farming and quality.* Experience in coffee farming and processing is a determining factor in coffee quality improvement. Fortunately, most farmers have a long experience, with the average of 18 years.
4. *Quality improvement to gain value added*. Improvement of coffee quality can increase value added gained by the farmers. In the farmers can take over the activities done by collector, there is some portion of the margin in collector level (around Rp. 700/kg) that can be gained for the farmer. If the farmers take over sorting and re-drying activities, they can gain additional income of around Rp 275/kg coffee bean. The farmers can gain a higher profit margin if they can directly market their coffee to exporters.
5. *OTA Issue as a common enemy*. If European Union (EU) imposes the new OTA standard on Indonesian coffee, the coffee industry in Indonesia will face serious problem. Indonesia is likely to lose their market in EU of around 129000 tons per annum or around 42 per cent of total export. OTA issue will be common enemy of all Indonesia coffee stakeholders. Under this circumstance, all stakeholders are expected to increase their awareness that improvement of coffee quality is a must. They are expected to increase their collaboration and synergies to take substantial actions to improve coffee quality.
6. *Fair Trade for Coffee*. Fair Trade is a market that has a potential to help the poor, such as coffee farmers in Ngarip. Fair Trade is an approach to trade that has a strong development rationale, based on introducing previously excluded producers to potentially lucrative markets, building up the capacity of producers to trade effectively in the market and offering them a good price. Fundamentally Fair Trade aims to benefit primary producers and attempts to sell their produce to a niche market of consumers that are willing to buy goods that are identified as ‘Fair Trade’ and for the benefit of the producer, often at a premium price.

Efforts to Improve Coffee Quality

Coffee quality in Ngarip and other areas in Northern Sumatra have a potency to be improved. To realize this, some strategies and efforts have to be implemented. This study identifies some strategies and efforts that should be prioritized.

1. *Raising the issue of low quality coffee problems to national level.*

   Improvements of coffee quality require supports from all stakeholders of coffee industries. This issue must be lifted at national level to make all stakeholders aware about the problems so that the issue can be perceived as a common enemy. This strategy can be realized by increasing communication to all stakeholders by various forms of media, such as seminars, workshops, meetings, and publications in mass media mass.

2. *Increasing farmer motivation and believe on the role of coffee improvement*

   Farmer motivation to achieve their desires and believe that better coffee farming and quality can be an instrument to achieve their desires, are two important factors that have a significant contribution for coffee quality improvement. Therefore, these factors have to be used as a mean to improve coffee quality. This can be done through formal and informal farmers' organizations forum.

3. *Creating fair price for better coffee qualities.*

   Fairer price for better coffee qualities is a must. If markets can provide sufficient price incentives to better coffee qualities, the farmers will produce as much as the demand. The results of financial analysis provide some alternative premium and fairer prices for better coffee qualities.

   Scenario 1. Similar profit margin as producing asalan quality (break-even).

   Under this scenario, the minimum price premium for producing Nestle quality is 13.5 per cent, depending on the proportion of off-grade coffee as the results of producing Nestle coffee.

   Scenario 2. Break-even + cost of family labor.

   Under this scenario, the premium prices range between 21.1-23.1 per cent. For example, if the off-grade coffee is 20%, then the premium price for Nestle quality is at least 23.1 per cent higher than that of *asalan* coffee.

Scenario 3. Break-even + cost of family labor + quality premium.

Under this assumption, then the prices premium range from 33.6 - 48.1 per cent higher than *asalan* price, depending on level of quality premium (10-15 percent)

Besides considering the price premium, time of payment for the farmers should also be considered. Farmers can not afford any delay in payment to be more than 7 days because they have to use their money for various purposes.

4. *Expanding Market for Better Coffee Quality*

Some buyers, such as Nestle and Indocafco have provided markets for better quality coffee with relatively fairer prices. However, the size of the markets has been limited. Thus, efforts to create these markets are key factors to improve coffee quality in Indonesia. Considering the weakness of Individual and farmer organization to create and access the markets, mediator institutions, such as government institutions and private institutions could have a better access to these markets. ICCRI has a good contribution in linking farmers and buyers. In Bali, ICCRI has supervised farmers to improve coffee quality in two regions, namely, Kintamani for Arabia and Pupuan for Robusta. More importantly, ICCRI has linked the farmers in the two regions to the buyers so that market for better quality coffee is not a constraint. In the future, local government officers and private organization should also conduct this kind of role.

6. *Provision of credit*

Insufficient cash money has caused most farmers are in an interlocked market situation that block the farmers to improve their coffee quality. To break this vicious circle, credit availability is a determining factor. Under the new government that is likely to have a higher attention to agriculture in general, the provision of soft loan for farmers is expected to increase. For example, in 2005 Department of Agriculture will provide soft loan of more than Rp 2000 billions for farmers, especially poor farmers.

7. *Empowering farmer organization*

The results of analysis show the importance of farmer organization in coffee quality improvement. Therefore, the weak farmer organizations in Ngarip have to empower

by training on management/organization, negotiation, and capital supports. ICCRI has good and long experiences in empowering farmer organization.

8. *Development of fair trade for coffee*

   This is a long term perspective effort. However, this has to begin because thus avenue can have a significant improvement in term of coffee quality and farm income of smallholder in developing countries.

CHAPTER 1
INTRODUCTION

1.1. Background

Lampung Province is one of main coffee production and export center in Indonesia. Out of 686837 tone of Indonesian coffee bean production in 2002, Lampung produced around 150193 ton or contributes to around 22 percent of Indonesian total production. As one of main coffee exporters, Lampung contribution has been 50-70 percent of 325,009 tones of Indonesian total export (*Direktorat Jenderal Bina Produksi Perkebunan* 2003). This implies that Lampung plays an important role in Indonesia coffee industry.

In contrast with its important role, coffee quality produced in Lampung is considered to typically have high defect levels with a number of different defect types. Based on survey data conducted in 28 June – 29 July 2004, the defect ranges from 80 – 383. Moreover, with moisture content (MC) ranging from 11.9- 25.0 per cent, around 92 per cent of coffee produced by farmers has high moisture contents (more than 18 percent). This indicates that not only the quality is low but also the quality variation is also very high with 92 percent and 13 percent of coefficient variation of defect and MC, respectively. This poor coffee quality related to some factors such as coffee berry borer, poor harvest practices, poor drying and storage, and poor hulling (Ismayadi and Zaenudin 2002) high moisture content in farmer and trader stored coffee is also thought to be a problem.

This poor coffee quality in Lampung is mostly produced by two exiting systems. The first system is applied by indigenous farmers who use traditional practices, such as heaping and composting coffee to dry it. The second system mostly adopted by transmigrated farmers originally from Java who employs rudimentary systems to process their coffee (Ismayadi and Zainudin, 2002).

Under the existing coffee quality, coffee produced in Lampung will be difficult to maintain its share in European Community (EC) market due to a new standard or norm related to OTA imposed by EC. By January 2005, EC will impose a 5 ppb maximum for roasted coffee and a 10 ppb maximum for instant coffee. Since OTA cannot be eliminated

during the various stages of coffee, such as drying and roasting, and then this implies that the standard will be also imposed to coffee bean, produced by exporting countries, such as Indonesia. In other words, Indonesia as a producing country has to improve the coffee quality to maintain or even to increase its share in EC market (Zaenudin and Ismayadi, 2001).

In line with this problem, a system mainly consisting of better harvesting technique, processing, and marketing, has been introduced by Nestle to improve coffee quality, well known as Nestle quality. Since 1984, the system has been introduced and developed in Ngarip Village, Ulu Belu Sub-district, in Lampung Province. Besides improvement on farmer organization and extension services, the system consists of ripe cherry picking, better drying process, and a higher price guarantee by Nestle for Nestle coffee quality. The system has been perceived to have significantly impact on improving farmers' coffee quality in order to produce grade 4 Robusta with low risk of OTA contamination (humidity less 13% and defects less 120). Moreover, the system has been claimed to empower the farmer organization and marketing system. The volume of Nestle coffee absorbed by Nestle in Lampung ranges from 2000 –3000 tones per year.

If these facts are true, then the system, hereafter called Nestle system, could be an alternative to respond the OTA standard imposed by the EC. The system can be reproduced in Lampung province, even in others provinces. To realize this, the system should be defined and evaluated whether this can be reproduced, considering the constraints and opportunity to implement this system.

1.2. Objectives

Based on the background, there are two main research problems to be answered in the study, namely, the reasons and how farmers adopt the system and how system can be reproduced/adopted in other regions. Following the two problems, then the specific objectives of this study are:

1. To define, describe and verify the steps in the 3 main production and marketing systems in the region, namely (i) traditional coffee processing systems by Indigenous farmers; (ii) the coffee processing system used by transmigrant farmers; (iii) the Nestle system.

2. To identify the constraints and opportunities to changing the systems in order to reduce the risk of OTA and poor quality.
3. To propose a set of conclusions on how to reduce the risk of OTA occurrence and improve the quality of coffee from Southern Sumatra.

CHAPTER 2
RESEARCH METHOD

The three main objectives of the study have different method of sampling and data analysis. Therefore, the sampling and data analysis that are applied are described separately.

2.1. Research Method for Objective 1

The objective 1 of this study is to define, describe and verify the steps in the 3 main production and marketing systems in the region, namely (i) traditional coffee processing systems by Indigenous farmers; (ii) the coffee processing system used by transmigrated farmers; (iii) the Nestle system. This objective covers the following aspects:

1. Variation in harvesting, processing and trading techniques is in each system, such as, quality of harvest (cycle, maturity % of ripe) drying (period, turning, drying floor);
2. Actors and their function(s) in the 3 producing and marketing chains (farmers, farmers' groups, middlemen, traders, exporters,);
3. Merits of each system, particularly the Nestle system;
4. Points in each of the 3 processing and trading system which system is more risky of OTA contamination and where quality problems occur.

The sampling technique to achieve the Objective 1 is by taking 30 samples of farmers were chosen using stratified random procedure on the basis of location, farm size, and origin (transmigrated and indigenous). Each farmer will be interviewed using 2 types of questionnaires. The first questionnaire basically open questionnaires to assess farmer labor use, financial aspects of Nestle and non-Nestle system. The second questionnaires is related to knowledge, farm size, income share from coffee, technology applied, marketing, price incentive, farmer organization, constraints to apply a new technology, information access, and opinions to overcome the constraints.

Measurement of MC, Defect for sample (30 samples), OTA for 10 clustered samples (with intention of "story" of sample like under splitting, heaping, etc.)

2.2. Research Method for Objective 2

The objective 2 of the study is to identify the constraints and opportunities to changing the systems in order to reduce the risk of OTA and poor quality. Constraints may cover a range of factors such as price, exporters' buying policy, farm economics, social factors, education, infrastructure, communication, pest and disease in coffee. Opportunities might be linked to reduced defect levels associated with improved handling/processing practices, the possibility of shortening the marketing chain, greater acceptability in case of more stringent application of OTA limits internationally, market demand for better quality Robusta

To get these data and information, interviews were conducted to all stake holders, namely, farmers, farmer groups, Nestle extension service, government officers (*Dinas Perkebunan*), middleman, Nestle agent and trader, other exporters. For farmer, 65 samples of farmer were also chosen using stratified random procedure on the basis of location, farm size, and origin (transmigrated and indigenous). These farmers were only interviewed using the second type of questionnaire. This implies that there are 95 farmers interviewed using this type questionnaire.

Two kinds of farmers group (FG) or rural production organizations (RPO) were interviewed. The first farmer group was the Coffee Farmer Association, while the second one is Farmer Business Group (*Kelompok Usaha Bersama*). The interview was focused on their role, decision making process, development of Nestle system, harvesting, and processing method adopted by farmers, marketing system, constraint to adopt Nestle system, sources of information, and solutions to overcome the constraints.

There is only one type of middlemen or collector that is, collector that buys Nestle coffee and *asalan* coffee. In other words, there is no specialization of trader who only buy Nestle coffee or *asalan* coffee. The focus on the interview is on some aspects of marketing system, such as, contract (formal/informal), story about coffee chains, interlock the market, price formulation/negotiation, control/criteria of quality and how to measure, access of credit for each chains, period of holding coffee, type of processing they do (re drying, sorting, grading). However, some other issues such as the constraints, technology harvesting and processing are also discussed.

Some type of interview is also discussed with exporters (Nestle, PT Putra Bali, PT Indokom, PT Indocafco, and Association of Indonesian Coffee Exporter/AICE). However, the interviews were focused on:

- Policy of buying (criteria of quality, how its measured, etc.)
- Policy of export (market structures, sort of grades etc.)
- Treatments applied to the coffee (re-drying, grading, sorting, period of storage)
- Possible strategy might develop especially to the "new" Nestle system.
- Information of any issue from importing countries they have (regarding of quality or OTA)
- Possible response to implementation of OTA limit by some countries (EU).

For quality test, sample taken 500 g each of farmer, collector, trader, and exporter were tested.

Two extension services, namely Nestle AgriService and Local *Dinas Perkebunan* were interviewed. The interviews were focused on general policy, services, constrains on dissemination, benefit of the service, future program, source of information, and method/media in the transfer of information/knowledge.

2.3. Research Method for Objective 3

The third objective of the study is to propose a set of conclusions on how to reduce the risk of OTA occurrence and improve the quality of coffee from Southern Sumatra. This objective is basically a synthesis of the first two objectives.

CHAPTER 3
SITUATION ANALYSIS: FARMING, PROCESSING, MARKETING, AND HOUSEHOLD INCOME

3.1. General Feature of Ngarip Village

Ngarip Village is located in Ulu Belu Sub-District, Tanggamus District of Lampung Province. The Sub-District with total area of 32.000 ha is one of the coffee producing centers in Lampung. Total coffee production in sub-district has contributed around 18.000 ton per year or around 12 per cent of total coffee production in Lampung.

Ngarip village is around 132 km from the capital city of Lampung and is around 90 km from the capital city of the district. The size of Ngarip is around 20 km^2 and total population is 5,030 people, consisting of 1,007 families. Desa Ngarip consists of 7 sub-villages (dusun), namely, dusun Sendang Agung, Wiji Mulyo, Wonosari, Sidorejo, Sidodadi, Ngarip Induk and Giri Mulyo

The agro-ecosystem of Ngarip is suitable for coffee cultivation. Its lattitude is 800-1100 above sea level and its rainfall is between 2 354 mm/year and 193 rainy days (Table 1). These features indicate that the location has a good agro-ecosystem for coffee production. With this situation, Ngarip is known as on of the coffee producing centre in the region. The total coffee plantation is around 1100 ha and coffee bean production is 816 tones per annum. The yield is 816 kg coffee bean/ha/annum. Around 92 per cent of the inhabitants in Ngarip are coffee farmer and around 70 per cent of their income has come from coffee farming (*Statistik Desa Ngarip*, 2003).

Transportation is one of main problems to and within the village because all roads to and within Ngarip have not been paved. In order words, all roads basically consist of corrals and soil that will be very muddy during the wet seasons. The only vehicles that can be used to and within village are four wheel drive and special motor bike called trail motor (motor trail).

Table 1. The Number of Rainfall and Rain day in sub-district Pulau Panggung, Ngarip

Month	Rainfall (mm)	Rain Day (day)
January	554	25
February	336	21
March	339	23
April	158	23
May	108	8
June	131	15
July	161	18
August	22	7
September	112	9
October	144	11
November	137	19
December	152	14
Total	2354	193

Source: *Unit Pemberdayaan Petani Pulau Panggung* (2004)

3.2. Farm Household Characteristics

In general, the heads of households are in their optimum age, ranging from 21-46 years old. The size of family is around 3.6 with potential labor force is 780 man-days per annum or 65 man-days per month. Their education levels are generally very low. Around 38.5% of the heads of households are not graduated from elementary school while around 40.0% just graduated from elementary school. The weakness in the education level, however, has been compensated by their long experience in coffee farming. They have been involved in coffee farming around 18 years implying that they have long experience in coffee farming, processing, and marketing.

Coffee has been the main source of income for most farmers in Ngarip. More than 92% of farmer in Ngarip claimed that coffee as their main income. Moreover, 63.5% of farmers stated that the share of income from coffee faming is more than 75%. In general, more than 82% of farmer stated that the share of coffee farming on their income more than 50%. This indicates that any improvement on coffee activities will have a significant influence on farmers in Ngarip.

3.3. Farmer Group and Extension Services

The roles of farmer groups or organizations in Ngarip are marginal. The activities of FG have been in minimum level, indicated by the low participation and benefits of the organization to the farmers. For example, the participation level of Farmer Business Group (Kelompok Usaha Bersama/KUB) is only 31.3% indicating that more than two third of farmers do not participate in the KUB. The other form of farmer organization is religious organization (*kelompok pengajian*). Although the main activities of the this organization is related to spiritual activities, this organization could also be used to discuss various aspects of faming, especially coffee farming However, the level of participation is also considered low with participation level around 38.5%. Even, around 30.2% of farmers do not join any farmer organization.

Ineffectiveness of farmer organizations and inadequate local government supports have caused ineffectiveness in extension activities. As extension officers stated, they can effectively conduct their program because of limitation on facilities (transportation and communication), incentives, and bad infrastructure, especially road. As a result, farmers gather information and knowledge required from other farmers and traders. More than 78.1% of farmers get information from other farmers; only 9.4% of farmers get from extensions and 3.1% from farmer groups. Moreover, there is no any form of cooperation between farmers in Ngarip and other business units surrounding region. This situation support perception that coffee farmer in Ngarip just likes to be isolated from the rest of the world. Unless these constraints can be reduced, transfer of knowledge to increases in this region will be a difficult to be realized.

3.4. Nestle Programme

Considering problem faced by the farmer in Ngarip and moral obligation of Nestle to help farmers where the company operates, Nestle through Nestle Agricultural Services have tried to supervised the coffee farmers in the region. Since 1994, Nestle has developed and given a program covering supervision and empowerment of coffee farmers by introducing some programs, such as, improvement of coffee cultivation, harvesting, and processing, marketing, and also diversification. The programs were designed to be flexible

following the farmers' capacity and interest. Thus, the level of the adoption has been varied, from not adopting to fully adopting the programs.

Kurniawan (1999) stated that the supervision packet of Nestle Agricultural Services consists of the following supervisions:

1. Coffee cultivation and harvesting. The program is intended to improve farmer knowledge and technique in cultivating and harvesting. By this supervision, the coffee farmers in Ngarip are expected to increase their productivity of coffee plantation and quality of their product.
2. Coffee quality control and market information. This supervision is intended to increase coffee farmers' capability in improving and controlling their coffee products (coffee beans) so that coffee quality produced in Ngarip can be improved, indicated by the decrease in MC and coffee defect. Moreover, this supervision is also intended to give the current situation of coffee market in regional and international market.
3. Business management. Nestle provided opportunities to the farmers to joint training and fieldwork in order to increase their management capacity. The topics of training include agribusiness management, cooperatives, and problem solving techniques.

Establishment of Margo Rukun Farmer Business Group or *Kelompok Usaha Bersama (KUB) Margo Rukun* in 1996 is considered as one of the main achievement of the Nestle programs. The member of the KUB has been 344 persons and 255 persons (74 per cent) are from Desa Ngarip. The rest comes from the villages surrounding Ngarip Village. KUB manages many activities including (i) buying and selling of coffee grade 4, well known as Nestle coffee, produced by its members; (ii) lending credit to the members; and (iii) supervision especially on farming system/diversification.

The most important role of the KUB are to buy Nestle coffee produced by the member and sell the coffee to Nestle in *Panjang Factory* in Bandar Lampung, capital city of Lampung province. Under this system, KUB has some important role. Firstly, the KUB represents the member in negotiating the price of Nestle coffee, although their bargaining position has been relatively weak compared to the Nestle. The KUB then forwards the price to its member by putting the price in the KUB's office. Secondly, KUB points out

some traders as agents to buy and process Nestle coffee. There are 3 agents in the Ngarip villages and its surrounding with total share around 70-80% of Nestle coffee produced in the regions. Under this system, the agents buy Nestle and non Nestle Coffee. For non-Nestle coffee, the agents do some processes, such as re-drying and sorting in order o meet the Nestle coffee standard.

Secondly, the KUB has an important role in negotiating the volume of coffee that will be bought by Nestle. Nestle is likely to keeps its traditional suppliers/traders to fulfill its demand so that the supply form the KUB will be limited. For this purpose, Nestle and KUB negotiate the volume of nestle coffee that will be supplied by the KUB (quota). KUB then distributes the quota among agents and KUB. From the agents, the KUB receives fee of Rp 100/kg of coffee sold to Nestle. This fee is used to finance the activities of KUB such as for credit, supervision, and administrative expenditure.

Thirdly, the KUB provide loans to its members to buy some agricultural inputs, labor cost (harvesting) and for daily expenditure (food, education, and health). This loan plays an important loan because Ngarip is an isolated village where no bank is operating in the village and cost (interest) of non-formal lending institution are generally high (about 2 per cent per month).

3.5. Farming System and Labor Allocation

As mentioned before, the main source of farmers' income in Ngarip is from coffee, supported by other crops, such as, rice, pepper, chili, tobacco, beans, soybean, cassava, sweet potato, and bananas. Farmers in general have around 1.4 ha of intercrop farming where coffee as the main crops and have a 0.25 ha of rice farming. Except for rice, these crops are cultivated as a mixed farming where coffee as the main crops and other crops as intercrops. Some farmers also rise cattle, mainly goat, cow, and chicken. In addition, some farmers earn some income from non-farm sectors, such as labor and transportation services. The general features of farming system in Ngarip are presented in Table 2. As seen in the table most farmers have more than one sources of income, implying that crops diversification is a common feature of farming system in the region. Beside to increase income, this system is very useful to reduce technical and price risks. Other crops, such as

rice, are mostly planted to fulfill their household consumption, while other crops and cantles are cultivated to generate incomes (cash crops).

Since most labors used are family labor, the family labor allocation is an important factor determining the performance of farming system and efforts to improve coffee quality. In average, the family labor availability (potential) is 780 man-days per year or around 65 man-days per month. This family labor availability is allocated for coffee farming and its intercrops, rice farming, and non-agricultural activities.

Table 2. Farming and Non-Farming Activities of farmers in Ngarip

Type of Farming	**Percentage (%)**
(Coffee + Intercrops)	16.7
(Coffee + Intercrops)+ Rice	13.3
(Coffee + Intercrops) + Cattle	16.7
(Coffee + Intercrops) + Non-farming	23.3
(Coffee + Intercrops) + Rice + Non-farming	20.0
(Coffee + Intercrops) + Cattle + Non-farming	6.7
(Coffee + Intercrops) + Rice + Cattle + Non-farming	3.3
Total	100.0

The labor availability per month is relatively constant while the monthly demands for labor are fluctuated. This situation leads to a situation of surplus and deficit of family labor. For certain month, family labor availability is higher than the demand, and vice versa (Figure 1). The general conditions of the surplus and deficit of family labor can be summarized as follows.

1. Between March to July and September can be considered as the busy months so that the family labor tends to be deficit at that period. On March, there are two main activities that absorb a significant family labor, namely, planting rice period I and beginning season of coffee harvesting. Period of April-June is the peak season of coffee harvesting that required a lot of labor. The harvestings (pickings of coffee cherry) are usually done three times (picking 1, 2, and 3). Moreover, at the periods, the farmers process their coffee cherry to be coffee bean. Depending on the techniques applied, the activities include drying, storing, hulling, and marketing. If the farmers want to produce Nestle coffee, an additional labor of around 26 man-days is required. On July, the farmers have to allocate some labor for harvesting,

processing, storing of rice, and harvesting intercrops. On September, the additional significant activity is rice-planting period II.

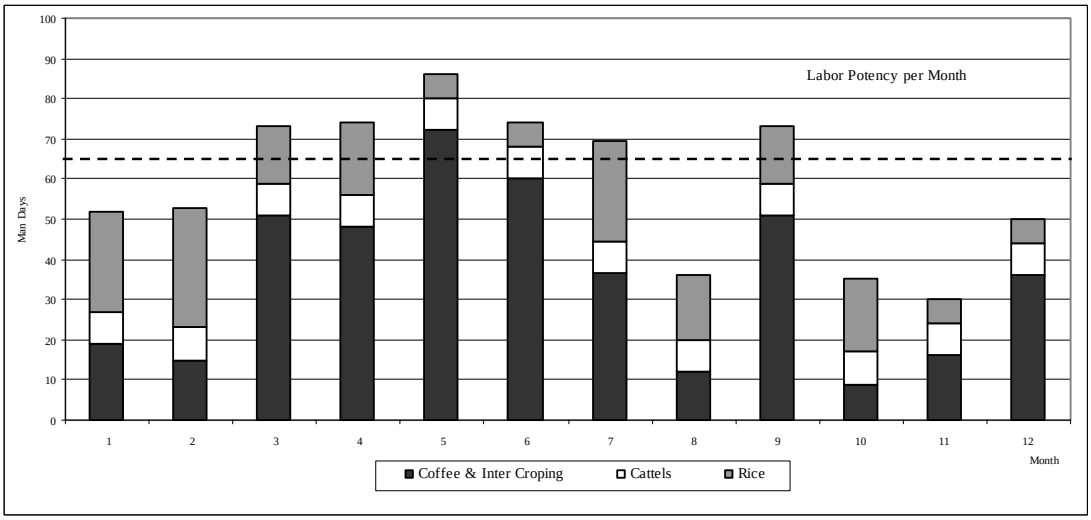

Figure 1. Family Labor Availability and Demand of Coffee Farmers in Ngarip

2. October to February can be perceived as the situation of family labor surplus. The busiest month is January when the farmers do some activities, such as. Land preparation for rice period I. For coffee, most activities are focused on maintenance of plantation.

3.6. Existing Coffee Processing /Techniques

Basically, there are three techniques/systems of coffee processing in Ngarip, namely, Java, Semendo, and Nestle systems. The first two are traditional ones, while the third is a system introduced by Nestle. Most farmers (86.4 per cent) applied the traditional system, while only around 15.6 per cent applied both traditional and Nestle system. The traditional system produces low-grade quality coffee (grade 5, 6 and off grade) that called *asalan coffee* while Nestle system produces Nestle coffee. During the survey, the share of *asalan* coffee was 88.8 per cent, while that of Nestle coffee was around 11.2%.

3.6.1. Java System

Java system is the most common system applied in Ngarip because most coffee farmers in Ngarip are transmigrates from Java. These transmigrants then continue their system in the region. The general features of the system are presented in Figure 2.

The peaks of coffee harvesting seasons in Ngarip are between May to July. In harvesting their cherries, 90 per cent of farmers applied stripe picking. Thus, red, yellow, and green cherries were harvested at the same time, two or three times a year. Labor wages for stripe picking is Rp. 7.500 per person per day or between Rp. 100.000 – 150.000 per ha of coffee plantation.

There are some reasons of farmer to conduct stripe picking. The first reason is that when cherries are converted to coffee bean, red cherry produces lighter coffee bean than that of yellow and green cherries. Thus, in term of weight, most farmers believe that they will get more coffee if the harvest mixed cherries (red, yellow, and green) compared to that of selective picking (picking the red cherries only). Second reason is that harvesting red cherries only bear a higher risk, due to pests and thieves.

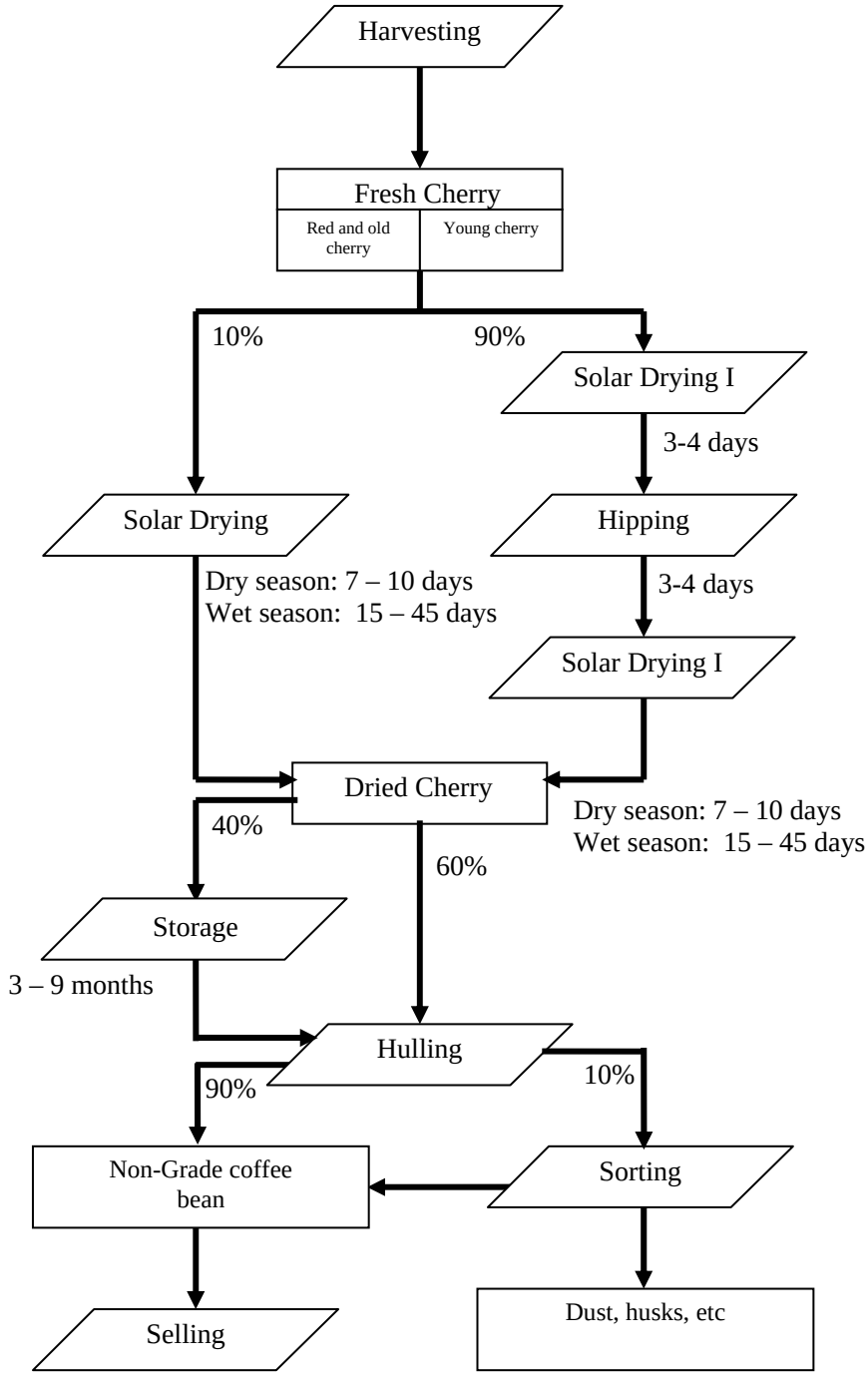

Figure 2. Javanese Coffee Processing

Other reason is that selective picking requires a higher skill and cost. While labor productivity for stripe picking is between 50-60 kg cherries per man-day that of selective picking is between 35-45 kg. Thus, for the same volume of cherries, farmers spend more labor costs.

After picking, farmers directly dry the cherries by laying the cherries in their home yard, mostly on the soil floor. After drying for 2-3 days, most farmers (90 per cent) covered their coffee with plastic for 3-4 days (heaping). The purpose of the heaping is to make the coffee bean color to be more homogenous (black chromatic). Then the coffee cherries are re-dried for 7-10 days during dry seasons and 15-45 days during wet season. Some farmers do not heap their coffee but they directly dry their coffee (Figure 2)

Using rented huller, around 60 per cent of farmers directly process their dried coffee to be coffee bean. Around 40 per cent of farmer store their dried coffee for around 3-9 moths, as a saving that can be processed to be coffee bean whenever needed. Another reason of farmers to store their coffee is that they expect a better price in the future. Only around 10-12 per cent of farmers sort their coffee bean implying that most farmers directly sell their coffee bean. Regardless the sorting process, coffee quality produced by Java technique falls to non-grade coffee bean. Using huller, farmers in general, store the coffee in the form of the dried cherries.

There are two ways of these farmers sell coffee to traders. First, farmer process their cherries in a huller and directly sell the coffee been to the owner of huller that are also a trader. Moreover, the cost of hulling expense is 4% of the coffee bean processed. Thus every 100 kg coffee bean, the huller's owner will get 4 kg the coffee. By directly selling to the huller's owner, these farmers can save some money because they do not pay transportation costs that are very expensive in the region.

3.6.2. Semendo System

Around 2 per cent of the resident of Ngarip village is local people of Semendo Tribe. They have different techniques in processing their coffee (hereinafter referred to as Semendo System). Basically, there are two main Semendo processing techniques, called Semendo A and Semendo B

In general, processing of Semendo A is almost the same as the Java system. Harvesting technique is stripe picking, conducted 2 – 3 times each crop season. They are very seldom to apply selective picking. The processing coffee hereinafter is equal to Java processing. The main difference is in second step where Semendo farmers pile up the new coffee cherries in its home yard before they are dried (Figure 3.A). These coffee cherries

are not laid on the floor without any protector, such as the plastic protector. The period of the piling up ranges from 5 – 10 days, depending on the period of picking up. After All coffee cherries were harvested and piled up, then the cherries was dried.

The main reason of farmers doing this piling up process is to increase their efficiency in drying process, especially in labor use because they do not have enough labor and cash money to hire labor. By doing this techniques, they need to dry their coffee only once, not every harvest period. The rest of the process is basically the same as Java System.

Some Semendo farmers differently process their coffee compared the previous one. The main difference is that before drying, the wet coffee cherries were broken/husked using a kind of a splitter machine (Figure 3.B). About 30% from total production in Semendo use this process. The husk of seed is clean and there is no any mucus on the surface of its seed. This process is conducted to fasten drying process, especially when the farmers urgently need cash money. Drying process is only half to three days, depending on the weather. After drying process, coffee beans were differentiated from dusk and husk.

The machines used to break the cherries (splitter) were designed by a farmer at Muara village. This Machine differs from the machine of pulper and also huller. In Muara village of Kampong Sukadamai, there are 3 machines of this. Interview to the one owner of the machine stated that almost entire farmer in Muara village doing this process. The cost of splitting is Rp. 600 /can. In addition, some farmers in Ngarip also applied this process in order to fasten the drying process. However, the machine used is very traditional and moved by hand. Some other farmers use equipment such as hammer to break coffee cherries.

Because very fast drying process, the MC of the coffee bean also still high. For drying process of 0.5 – 1 day, the MC was around 35 per cent, while that for 2 days is about 30 per cent. The drying process of 3 days will produce coffee bean of about 20 per cent MC. Because of differences in MC, collector will determine prices based on the MC (Table 3). These prices are based on the price of *asalan* that was around Rp 4000 during that period.

The features of coffee bean produced using Semendo B system can be differentiated form the coffee bean processed with the processes. Coffee bean produced

using Semendo B is usually bigger, high MC, more black bean, and rather flat. To increase the quality of this coffee, collectors/traders usually re-dry and sort the coffee to satisfy the quality required by traders/exporters.

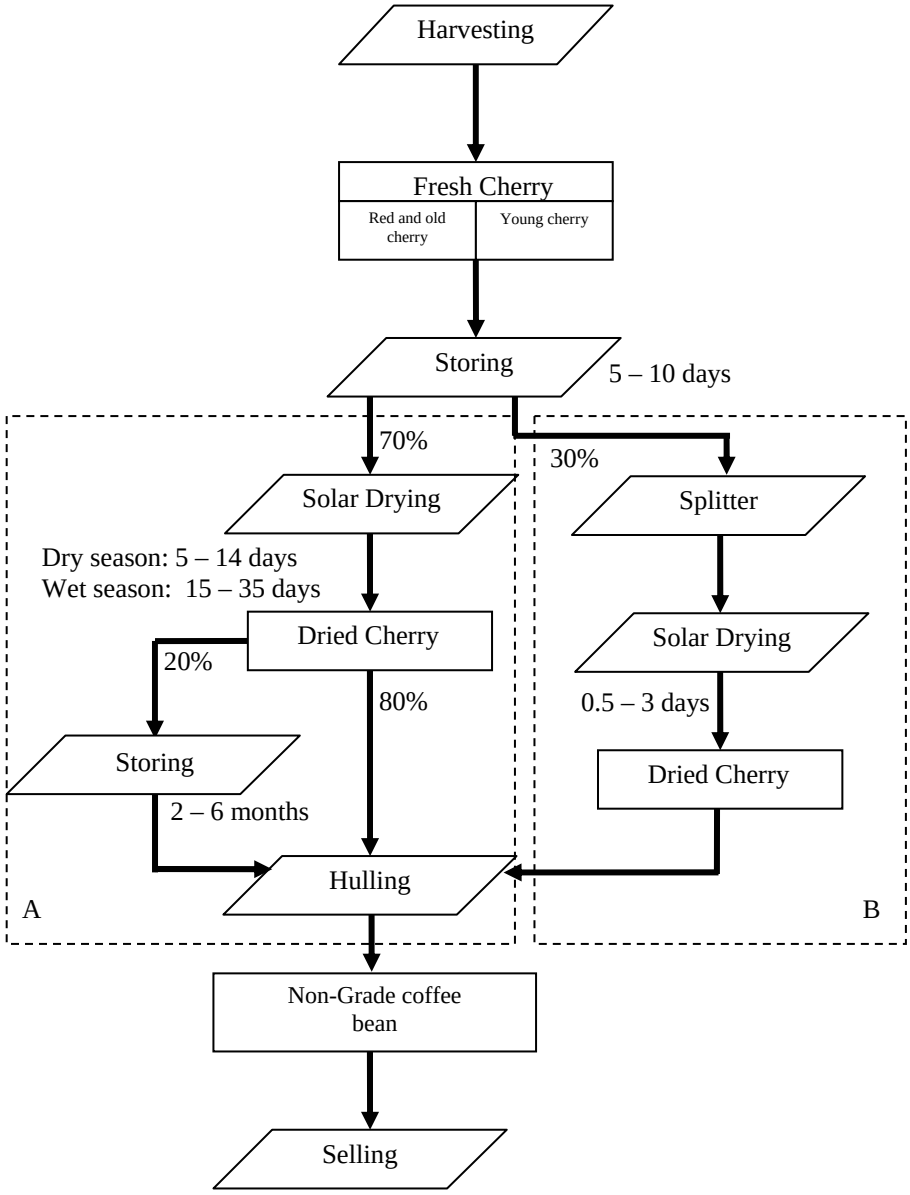

Figure 3. Semendo Coffee Processing

Results of interview with the traders obtained the information that price of coffee bean processed by Processing Semendo B is cheaper than other processing.

Table 3. The Price of Coffee Bean Processing with Semendo B

No.	Duration of draining (days)	Water content (%)	Price (Rp/kg)
1.	0.5 – 1	35	3000
2.	2	30	3300
3.	3	20	3700

3.6.3. Nestle System

As mentioned before, one objective of Nestle Agricultural Services is to improve coffee quality, in this case in Ngarip. To start with, Nestle developed and enhance the coffee farmers' organization by establishing a coffee farmer group or *kelompok usaha bersama* Marga Rahayu (KUB Marga Rahayu). Nestle used this farmers organization to deliver and supervise Nestle programmes. In term of coffee quality improvement, after some changes, Nestle currently introduced four coffee grades, namely Grade A1, A2, B1, and B2. The Basic criteria for the grade of using moisture content and defect can be seen in Table 4.

Table 4. Coffee Grades Introduced by Nestle

Grade	Moisture Content (%)	Defect
A1	< 11	< 80
A2	< 12	< 80
B1	< 11	80 – 120
B2	< 12	80 – 120

In term of improving coffee quality, Nestle introduced a process that is basically standard technique in coffee processing (Figure 4). The principles of the system are selective picking and good drying process. Following this, farmers were introduced to selective picking that is to pick coffee cherries that are old with yellow reddish. In one harvest season, the picking process are 3 – 4 times with labor cost is Rp 10000/man/day.

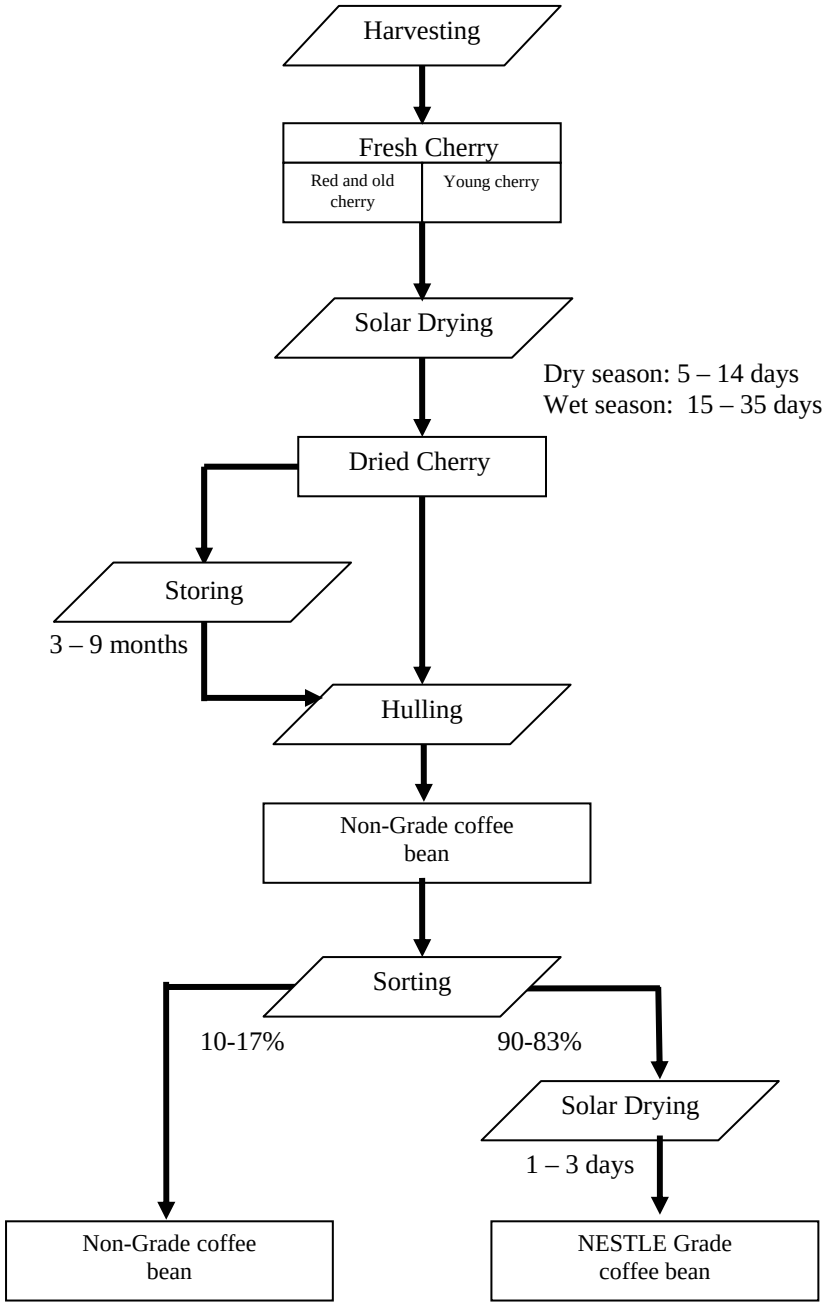

Figure 4. Nestle System

Coffee cherries dried using good drying floors such as on concrete and tarpaulin. The drying periods are generally longer than previous system and vary depending on weather. During dry season, drying period ranges between 10 – 14 days, while during rainy or cloudy season, it takes between 30 – 50 days. Farmers determine the level of dryness (MC) by nipping coffee cherries. If the coffee cherries have been stringent and cannot be nipped, they will stop the process because MC satisfies the Nestle Standard. Then, the

cherries are either kept as savings or milled directly to be coffee bean. If farmers mille their coffee, the cost is 4% of total cherries.

To produce Nestle coffee, then coffee beans are winnowed to eliminate the dirty and husks. After that, they are sorted to separate the good coffee bean with coffee bean that are black chromatic, broken and bored. Winnowing cost is Rp. 7500 / 100 kg while that of sorting is Rp 2500/ 100 kg. The good coffee beans are then re-dried to make their MC to be maximum of 12 per cent. The coffee beans, which do not satisfy Nestle quality, then will be sold as *asalan* coffee.

3.7. Coffee Marketing Systems

In general, coffee marketing systems in Ngarip can be seen as depicted in Figure 5. Around 80 per cent of coffee farmer sell their products to the local traders (collectors). The products sold to collectors are usually *kopi asalan*. Some collectors do some treatments, such as re-drying and sorting, while some others directly sell to their products to traders that usually locate in Ulu Belu sub district. For those collectors who do some treatments, they have two kinds of coffee product, namely, *kopi asalan* and Nestle coffee. They will sell their *kopi asalan* to the traders in the sub district and sell their Nestle coffee to the KUB agents. For those only produce *kopi asalan*, the only choice is the traders in the Sub district. Around 71 per cent of o coffee sold by collectors is *kopi asalan* while the rest are Nestle coffee. The traders then sell their coffee to the exporters in Padang Panjang, Bandar Lampung. On the other hand, the KUB agents will sell their Nestle coffee to Nestle, also in Padang Panjang, Bandar Lampung.

For farmers producing Nestle coffee, they can sell their coffee to KUB or KUB agents. KUB will directly sell the coffee to the Nestle, while KUB agents have two options, namely, Nestle of Exporter. The choice of the KUB agents will depend on prices offered by Nestle and exporter. If Nestle offers higher prices, then the KUB agents will sell to Nestle, and *vise versa*.

There are two common payment systems, namely, cash and carry and loan system. The first system will probably adopted when there is no any kind of cooperation between the parties involve in the coffee trade (farmer➔collector; collector➔trader; trader➔exporter).

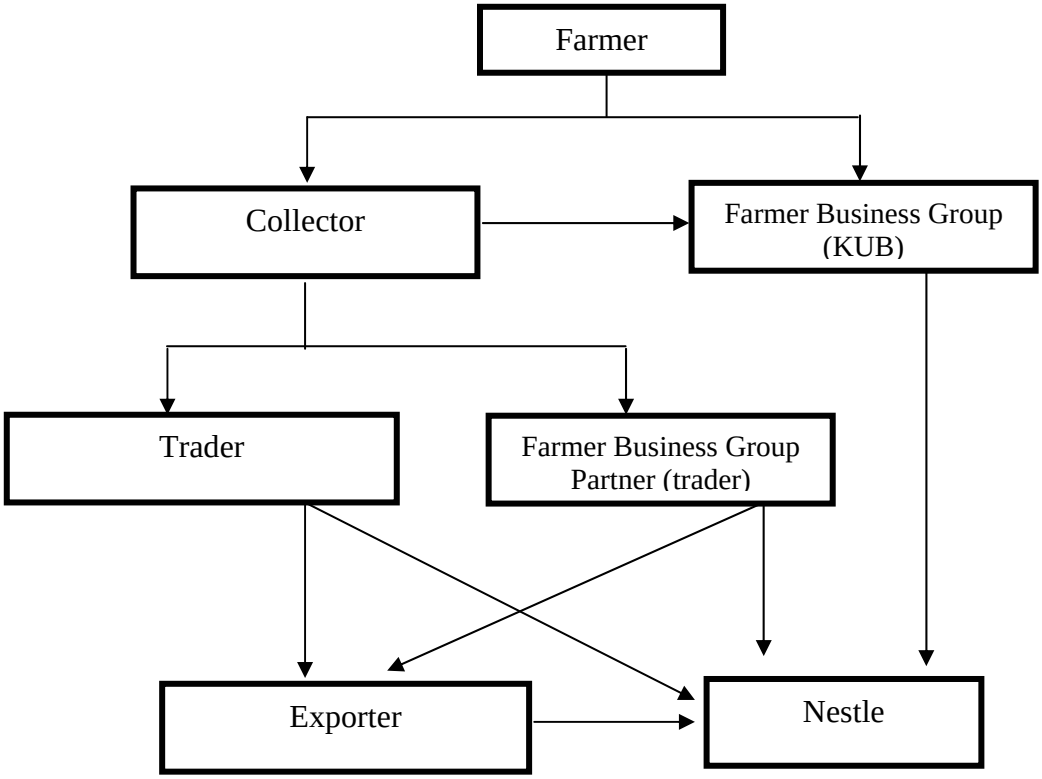

Figure 5. Coffee Marketing Channels in Ngarip

Loan system is the most common of repayment system for the two main reasons. Around 51 per cent of farmers admitted that they have to borrow some money to collector. Under this system, the collectors give some loan to seller before coffee trade is realized. Before harvesting seasons, most seller, especially farmers, need cash money to satisfy their need such as for fertilizer, food, education, health, and ceremonial activities. The easiest way to get cash money is from the collectors because there is no any administrative procedure to borrow money from them. On the other hand, by lending money to seller, the buyers have supply guarantee because the sellers have to sell their coffee to the buyers lending money to them. Under this cooperation, the sellers, especially farmers, are locked so that they actually have no choices to sell their coffee to other buyers. In marketing jargon, this situation is called as an interlocked market. The sellers generally have a weak bargaining position in quality and price determination

Following the world coffee prices, the prices of *kopi asalan* and Nestle coffee have been highly fluctuated. Moreover, to attract farmers to produce Nestle coffee, Nestle have given some price incentives for Nestle coffee. In June 2004, farm gate prices of coffee in Ngarip ranged from Rp. 4000 – Rp. 4.500 per kg, depending on coffee quality. At the same

time, the prices of Nestle coffee ranged from Rp. 5316 – Rp 5618 per kg (Tabel 5). In the first and second week of July 2004, the prices of kopi *asalan* decreased to Rp 2900 – Rp. 3600 per kg, while those for Nestle coffee were Rp. 4438 - Rp.4686 per kg.

As mentioned before, collectors do some processing activities to improve coffee quality sold to the traders. Some costs incurred because of these activities are presented in Table 6. Total cost processing and handling at collector level was around Rp 568 per kg with net margin ranging between Rp 100/kg – Rp 400 per kg.

Table 5. Prices of Coffee in Ngarip based on Quality, 30 June – 14 July 2004.

Coffee Quality	**Price (Rp/Kg)**		
	June 30, 2004	July 7, 2004	July 14, 2004
A1	5618	4706	4686
A2	5532	4623	4603
B1	5399	4541	4521
B2	5316	4458	4438
Asalan	4000 – 4500	2900-3600	2900-3600

Table 6. Cost of Processing, Handing, Marketing and Margin for Coffee Trading

Description	**(Rp/kg)**	**Proportion (%)**
1. Farm Gate Price	4000	75.9
2. Collector	718	13.6
Sortation	93	1.8
Re-drying and packaging	32	0.6
Transportation	150	2.8
Weight loss(7 per cent)	263	5.0
Other costs including illegal tax and retribution	30	0.6
Margin for collector	150	2.8
3. Trader	450	8.5
Processing, handling, and marketing costs	300	5.7
Margin	150	2.8
4. Exporter	400	7.6
Processing, handling, and marketing costs	200	3.8
Margin	200	3.8
Total	5269	100.0

Traders also do some processing such as sorting and re-drying, handling, and marketing to exporters or Nestle in Bandar Lampung. Total cost for those activities was estimate around Rp 300/kg. The margins gained by traders are varied, depending on world coffee prices and situation of the demand and supply of coffee in the region. The higher the world coffee prices and the higher supply relative to demand, the higher margin gained by trader. The average net margin at trader level was around Rp 200/kg.

As traders, exporters also do some processing, handling activities to make the exported coffees meet the quality standard required by importers (buyers). These activities include sorting, polishing, fumigation, storing, and transportation with total cost around Rp 200 per kg. Margins gained by exporter are also fluctuated, mainly depending on the price of the contract between exporters and importer and price at trader level. In general, the margins range between Rp 100 – Rp 200 per kg.

Processing, handling, transportation, and marketing costs are generally fixed, at least in the sort term. In addition, bargaining position of farmers is the weakest among actors in coffee chain production and marketing. These situations cause farmers to be forced to bear the most price risks (price fluctuations). In other words, price risks will be distributed among the actors but the farmers will bear the most. As a result, when price decrease, the decrease will be mostly transferred to the farmer so that the farm gate price will decrease. For example, when the FOB price in Bandar Lampung around Rp 5269 per kg, farm gate price was around Rp 4000 or around 75.9 per cent of FOB price. However, when the FOB price decreased to be around Rp 4700 per kg, the farm gate price is around 66.4 per cent FOB price.

Related to coffee marketing and trade, Association of Indonesian Coffee Exporters or *Asosiasi Eksportir Kopi Indonesia* (AEKI) has important role to promoting Indonesian coffee in the world market. Moreover, AEKI has also some role in term improvement of coffee quality through its services (supervisions and training) to its member and farmers.

Following the AEKI officers, the number of registered exporter in Lampung Province is about 200, while the active exporters are estimated around 40 exporters. Lampung is the biggest coffee exporter in Indonesia with a share around 70% of the Indonesian total export of around 300, 000 tones. The main destinations of coffee exported from Lampung are Europe, The USA and Japan. Until now, there is no any complaint from

importing countries related to OTA contaminations. AEKI believes that improvement of coffee quality can be achieved through price incentives, training, and supervision.

In general, the traders and exporters have standard procedures to determine coffee quality. Two basic indicators used are moisture content (MC) and defect system with some modified standard procedures. Under this procedure, the coffee quality can be categorized as *asalan* (the lowest grade), grade 1 until grade 6. Based on the coffee qualities, the coffee prices are determined using a certain price incentive formula for a better coffee quality. However, the formula used only considers the MC and non-coffee contents (husk and dusk), not yet the quality improvement. For example, if the water content is 2 per cent higher than standard (12%) and non-coffee contents are 3 per cent then the price given by exporter is 5 per cent (2 per cent + 3 per cent) lower than basis price. If the water content is 12 and there are no non-coffee contents, then the price offered by exporters is basis price. Thus, under this formula, the efforts to improve coffee quality improvement are not given any price incentive.

3.8. Coffee Quality and OTA Contamination

The comparisons of coffee quality (MC and defect) in various actors can be seen in Table 7. In general, coffee qualities produced by farmers are very low with very high variation. Low qualities indicate by high MC with the average of 19.43 per cent and high defect of 210. High variation indicates by their high coefficient of variation, especially on defect value, reaching to more that 90 per cent.

Table 7. Moisture Content and Defect in Various Actor Levels

Actors	MC		Defect	
	Average (%)	CV (%)	Average	CV (%)
Farmer	19,43	13,94	210,61	91,66
Collector	19,08	10,56	189,00	47,35
Trader	17,77	8,85	140,24	26,58
Exporter	12,73	5,89	57,88	20,09

MC : Moisture Content
CV : Coefficient of Variation

Although collectors claimed that they do some processing activities (re-drying and sorting), the results are marginal. Their activities only reduced MC from 19.43 to 19.08 and defect value from 210.61 to 189.00. However, their activities had a significant impact

on reducing the variation of the quality, indicating by a significant decrease on coefficient of variation; both in term of MC and defect value (Table 7).

To meet the coffee quality imposed by exporters, the traders have to significantly improving the qualities by significantly reducing MC and defect value. This can be done by re-drying and sorting coffee bought from collectors. Their activities have a significant impact on quality improvement, indicating by a significant decrease in term of MC and defect value (Table 7).

Using more sophisticated equipments for drying, nipping, and sorting, exporters have to improve coffee qualities according to market demand (importers). The exporters decreased MC from around 17 to 12 and defect from 140 to around 57. Moreover, sorting causes coffee qualities becoming much more homogenous indicate by their low coefficient of variation.

Surprisingly, although the coffee processing techniques applied by farmers in Lampung are very risky to OTA contaminations; the results of analysis indicate that the OTA contaminations of coffee at farm level in the region are relatively low, below the limit applied of the EU (5 ppb). Based on 106 samples that re-grouped to be 20 samples, the average OTA contamination at farm level is 0.74 ppb; even 9 samples out of 20 has no OTA contamination (0 ppb). The maximum OTA contamination found in the coffee samples is 2.7 ppb. At trader level, the average OTA contamination is even lower, that is 0.36 ppb (Table 8.). All these figures indicate that in general, OTA contamination of coffee in Lampung has been relatively low, compared to standard that applied by the EU.

Table 8. OTA Contaminations of Coffee in Ngarip, Lampung

No	Origin of Sample	OTA content (ppb)
1	Trader	0.36
2	Farmer	0.00
3	Farmer	0.00
4	Farmer	0.00
5	Farmer	0.00
6	Farmer	0.00
7	Farmer	0.00
8	Farmer	0.00
9	Farmer	0.00
10	Farmer	0.12
11	Farmer	0.12
12	Farmer	0.39
13	Farmer	1.18
14	Farmer	1.18
15	Farmer	1.23
16	Farmer	1.43
17	Farmer	1.61
18	Farmer	2.06
19	Farmer	2.10
20	Farmer	2.70
	Average	0.74
	Standard Deviation	0.90

3.9. Household Income Structure

The average household income of farmers In Ngarip is Rp 5.69 million/year (Table 9). This indicates that, in general, most coffee farmers in Ngarip are poor or live below property line. For Lampung province, the poverty line is Rp 6.4 million/year/household. Thus, the development of coffee in Ngarip has no significant impact to reduce poverty in the regions.

As coffee as the main crop, the main source of farm incomes comes from coffee, contributing to around 70 per cent of total income. The contribution of intercrops is relatively small (10%), while that from cattle are even smaller. Rice farming has small contribution to farm income because their productions are not sold, but to fulfill household

consumption. This structure of income indicates that although the farmers have tried to diversify their income source, the main source of income is still coffee. Thus, any changes related to coffee farming such as climate, input prices, and output prices, will have a significant effect to farm income.

Table 9. The Structure of Household Income in Ngarip, 2004

Source of Income	**Income (Rp million/year)**	**Share (%)**
Coffee	3.81	66.96
Intercropping		
• Pepper	0.20	3.52
• Chili	0.16	2.82
• Others	0.28	4.92
Cattle	0.32	5.62
Rice Farming	0.23	4.04
Non-Agriculture	0.69	12.12
Total	5.69	100.00

CHAPTER 4
CONTRAINTS, OPPORTUNITIES, AND EFFORTS FOR COFFEE QUALITY IMPROVEMENT

4.1. Identification of Constraints and Factors Affecting Coffee Quality

Currently, most coffee produced by farmers was *asalan* quality. On the other hand, around 43 per cent of farmers used to produce Nestle quality in 1997 – 2001. Production of Nestle coffee was intensively promoted by KUB Margorukun, under supervision of Nestle staff. Moreover, the increase of Nestle coffee at that period was also attributed to high international and domestic coffee price.

There are some inter-related constrains and problem associated to the decreasing quality of coffee produced by the farmers, based on farmers perspectives are as follows (Table 10),

1. *Technical barrier*. This constraint is mainly related to difficulties faced by farmers to apply the improved techniques. This constraint is significant in inhibiting the farmers to conduct selecting picking since it was stated by 44% of farmers. Most farmers stated that conducting selected picking requires a higher skill and lower labor productivity. This condition discourages the farmers to conducting selected picking. To applying good processing and storing, the farmers have no any difficulties since only 4 per cent mentioned this factor as a constraint
2. *Technical-production risks due to pests and thief.* Although this is not a major constraint, about 29 per cent of farmers perceived that loss of production due to pest attack and thief is a major constraint. This is especially true for the coffee plantations that are relatively remote from the villages. As stated by the local authority in Ngarip, thief is one of the main problems in region because Ngarip is one of destination to hide for robberies from Java. Again, for conducting good processing technique, these risks are not a major constraint (4 per cent).
3. *Insufficient family labor*. This constraint has some facet including limitation availability of family labor, addition works for better picking and processing technique, and inefficiency due to small economic of size. This constraint is very

important factor, especially to prevent farmers (46 per cent) to apply a better processing and storing technique. With lower importance, this constraint is also an inhibiting factor to apply selected picking (27 per cent). As mentioned before, most farmers have other activities, including cultivating some intercrops, rice farming, and rising cattle.

Table 10. Constrains for improving coffee quality in Ngarip

Constraining Factor	Not conducting selected picking of Cherry (%)	Not Applying Good Processing and Storing (%)
Technical Aspect	44	4
Technical Risk	29	4
Insufficient Family Labor	27	46
Lack Capital	27	96
Interlocked Market	51	51
Insufficient Price Incentive	78	78
Small Market Size	73	73

4. *Lack of capital and cash money*. As mentioned before, most farmers are poor implying that they do not have enough money to finance the application of better technology that requires a higher cost. Around 96 per cent of farmers stated that they could not afford tarpaulin or cement floor (concrete) to apply a better drying technique. Moreover, the better processing system also higher costs for labor (drying and sorting) that cannot be afforded by most poor farmers. This constraint also inhibits around 27 per cent of farmers to apply selected picking because this technique requires a higher cost. If a farmer applies strip picking, the labor productivity is around 60-75 kg cherry per day, while that for selected picking is around 35-40 kg per day.
5. *Interlocked market*. Before harvesting seasons, most farmers need cash money to satisfy their need such as for buy agricultural inputs and labors, food, education, health, and ceremonial activities. Generally, they do not have enough money to finance these expenditures. The easiest way to get cash money is from the buyer (collectors) because collectors are the only access to get cash money in the villager. Moreover, there is no any administrative procedure to borrow money from the

collectors. On the other hand, by lending money to farmers, the collectors have supply guarantee because the farmers have to sell their coffee to the collectors lending money to them. Under this cooperation, the farmers, are locked so that they actually have no choices to sell their coffee to other collectors. In marketing j*argon*, this situation is called as an interlocked market. Around 51 per cent of farmer stated that they are under interlocked market situation. The farmers generally have a weak bargaining position in quality and price determination. Under this situation, the farmers will only obey the orders of the collectors, including the coffee quality produced by the farmers. For the collector, opportunity to gain value added is higher if they buy *asalan* coffee because it is less transparent, either in quality or process. Thus, the farmers will be forced to produce *asalan*.

6. *Insufficient price incentive for better coffee quality*. Buyers (collectors, traders, or exporter), using some formula have given some price incentives to the farmers. However, the incentives are considered to be not sufficient, because the incentives only consider weight due to MC and non-coffee materials. The incentive for better quality in term of defect and taste/aroma is not sufficient. The price incentives given by Nestle are higher than that by exporters. However, this price incentive is still considered to insufficient to compensate the costs and risks incurred because of producing better coffee qualities. Around 78% of farmer stated that insufficient price incentive as an important constraint to produce better quality coffee.
7. *Limitation of market size for higher coffee quality*. Nestle has given price incentives for better coffee qualities; however, the total better quality coffee that can be absorbed by Nestle (production quota) is limited although total buying of Nestle has been relatively high, around 80,000 tones per annum. For example, the production quota in 2003 was around tones; while in 2004 were 3000 tones. On the other hand, total production of coffee in Ngarip is around 18,000 tones. Around 73 per cent of farmers sated that market size is one of major constraints in increasing production of better quality coffee. Moreover, a Nestle officer honestly admitted that Nestle would not be able to absorb significant increase of Nestle coffee for three main reasons. Firstly, Nestle is not a trading firm, but an industrial firm that main function is to produce final products of coffee. Secondly, Nestle has its traditional supplier that should also be maintained. Thirdly, the traders, mainly

exporters, should also have contribution to absorb this product. In other words, Nestle urges a fair share to all traders in Lampung in providing markets for better coffee.

Besides using farmer's perceptions to identify the constraints and factors affecting coffee quality, regression analysis was also applied. In this case, two indicators of coffee quality, MC and defect, were analyzed. Price incentive and market size factors were not analysis because there is no enough time series data to satisfy the analysis. However, these two factors have been elaborated before on the basis of farmer's perception.

Regression analysis shows that there are some factors that could effect to quality improvement in term of MC and defect. As seen in Table 11, the believe of farmer that coffee farming and quality improvement could help farmer to achieve their desires/dream (BELIEVE-DESIRE) is one of the most important factors to improve coffee quality. If farmers believe that they can achieve their desire by improving their coffee farming and quality, they tend to have a higher chance to produce better coffee quality. In other words, motivation to improve their welfare through improvement of coffee quality is one of key factor.

The second factor that has a significant contribution to improvement of coffee quality is welfare level of the farmer (WELFARE LEVEL). The higher their welfare level, the higher coffee quality produced. Rich farmers imply that they have sufficient cash money to fulfill their production and consumption activities. Moreover they are not in the condition of interlocked market. This finding is consistent with the perceptions of the farmers that lack of capital and interlocked market are two important inhibiting factors for coffee quality improvement.

With lower degree of importance, some other factors, namely source of information (SOURCE – INFORMATION), availability of family labor (FAMILY LABOR), have also some roles in determining coffee quality. The more number of sources of information and the higher family labor availability, the better coffee produced. These also consistent with the farmers' perception discussed before.

Table 11. Analysis of Factors Affecting Coffee Quality, Moisture Content

Factor	Un-standardized Coefficients		t	Sig.
	B	Std. Error		
KONSTANTA	14,744	2,710	5,440	,000
AGE	1,136E-02	,033	,343	,733
EXPERIENCE	2,731E-02	,047	,575	,568
FAMILY LABOR	,231	,361	,640	,525
BELIEVE-DESIRE	,901	,298	3,021	,004
DECISION MAKING PROCESS	,484	,795	,609	,545
SOURCE –INFORMATION	,330	,430	,767	,447
WELFARE LEVEL	,622	,559	1,113	,271

$R^2 = 0.38$

In term of defect value as an indicator of coffee quality, the participation of farmers in farmers' organization (ORGANIZATION) a key factor (Table 12). The more active the farmers, indicated by the number of organization involved, the less defect of their coffee. This indicates that farmers' organizations, to certain extent, have a significant role in improving coffee quality. Another important factor that is very close to farmer organization is decision-making process of the farmers. The farmers that decide mostly their own decision or less interaction with others tend to produce higher defect value. From motivation aspect, the number of desires of farmer or level of motivation (NUMBER OF DESIRE) has also some contribution to improve coffee quality. The higher the number of desires waited to be achieved, the more likely the farmer produces better coffee quality.

The regression analysis also indicates that the welfare status of farmers is a determine factor. The richer the farmers, the lower the defect value of coffee produced by them. In general, the richer farmer has lower grade value of 17.5. This is consistent with the results on they analysis on MC. In addition, farmers' experience also has positive impact on defect value. The more experience the farmers, the less defect of their coffee.

Table 12. Results of Analysis for Defect

Factor	Un-standardized Coefficients		t	Sig.
	B	Std. Error		
KONSTANTA	277,301	91,360	3,035	,004
AGE	-,243	1,118	-,217	,829
EXPERIENCE	-2,002	1,600	-1,251	,217
FAMILY LABOR	3,359	12,179	,276	,784
BELIEVE-DESIRE	-85,858	27,042	-3,175	,003
DECISION MAKING PROCESS	-14,498	15,769	-,919	,362
SOURCE –INFORMATION	24,425	26,793	,912	,366
WELFARE LEVEL	-17,463	18,851	-,926	,359

A Dependent Variable: DEFECT

4.2. Opportunities to Improve Coffee Quality

There are some constraints and inhibiting factors for improvement of coffee quality in Ngarip. However, there are also some opportunities and avenues that can be used to improve the coffee qualities as described below.

1. *High Motivation of Most farmers*. The results of analysis indicate that motivations to achieve some desires play an important role in coffee quality improvement either in terms of MC or defect. The results of survey indicate that around **95** per cent of farmers still have some desires to be achieved. Some farmers even have more than desires indicating their strong motivations in their life. Thus, high motivation belonged to most farmers can be considered as an opportunity to improve coffee quality in Ngarip.
2. *Believe on important role of coffee to achieve their desires.* Around 91 per cent of farmer that believe that these desires can be achieved by improvement in their coffee farming and quality. The results of the analysis show that these believes have a contribution to improve coffee quality. In other words, a believe that improvement of coffee farming and quality is one way to achieve farmers' desire can also considered as an important opportunity to improve coffee quality.

3. *Good knowledge of coffee farming and quality*. Experience in coffee farming and processing is a determining factor in coffee quality improvement. Fortunately, most farmers have a long experience, with the average of 22 years. This indicates that long experience of farming could be considered as an opportunity to improve coffee quality.
4. *Quality improvement to gain value added*. Improvement of coffee quality can increase value added gained by the farmers. In the farmers can take over the activities done by collector, there is some portion of the margin in collector level (around Rp 700/kg) that can be gained for the farmer. If the farmers take over sorting and re-drying activities, they can gain additional income of around Rp 275/kg coffee bean. The farmers can gain a higher profit margin if they can directly market their coffee to exporters. This means that they take over some tasks of collector and trader. As seen in the table, the tasks to be taken over are not complicated because the farmers only need to decrease MC and defect marginally. Some portion of margin in trader level, amounting to around Rp 450/kg, can be gained by them. This is an opportunity for farmer to improve their income and welfare by improving their coffee quality.

Table 13. Moisture Content, Defect, and Margin in Various Levels

Actors	**MC**		**Defect**		**Margin (Rp./kg)**
	Average (%)	CV (%)	Average	CV (%)	
Farmer	19,43	13,94	210,61	91,66	
Collector	19,08	10,56	189,00	47,35	718
Trader	17,77	8,85	140,24	26,58	450
Exporter	12,73	5,89	57,88	50,09	400

5. *OTA Issue as a common enemy*. If European Union (EU) imposes the new OTA standard on Indonesian coffee, the coffee industry in Indonesia will face serious problem. Indonesia is likely to lose their market in EU of around 129,000 tons per annum or around 42 per cent of total export. This situation will paralyze coffee exporter, traders, collectors, farmers, and also be serious problems of the government of Indonesia. Thus, OTA issue will be a common enemy of all Indonesia coffee stakeholders. Under this circumstance, all stakeholders are expected to increase their consciousness that improvement of coffee quality is a

must. They are expected to increase their collaboration and synergies to take substantial actions to improve coffee quality. In other words, the rise of OTA issue is a good opportunity for all coffee stakeholders to make joint actions in order to improve coffee quality.

6. *Fair Trade for Coffee*. Fair Trade is a market that has a potential to help the poor, such as coffee farmers in Ngarip. Fair Trade is an approach to trade that has a strong development rationale, based on introducing previously excluded producers to potentially lucrative markets, building up the capacity of producers to trade effectively in the market and offering them a good price. Fundamentally Fair Trade aims to benefit primary producers and attempts to sell their produce to a niche market of consumers that are willing to buy goods that are identified as 'Fair Trade' and for the benefit of the producer, often at a premium price. The increasing number of Fair Trade products sitting on supermarket shelves and its increased credibility with international donors indicate that Fair Trade is continue to grow and the poor is expected to increase their share.

Fair trade seeks to change unequal relationships between producers to consumers and to empower producers. Therefore, fair trade places some important principles of fairness, namely, (i) producers receive a fair price - a living wage or for commodities, a stable minimum price; (ii) buyers and producers trade under direct long-term relationships; (iii) producers have access to financial and technical assistance; and (iv) sustainable production techniques are encouraged. The Fair Trade system benefits over 800,000 farmers organized into cooperatives and unions in 48 countries and coffee is one of the crops marketed in fair trade system. In general, the main contribution of Fair Trade to many of the groups studied is the development of capacity Oxford Policy Management's case studies of Kuapa Kokoo and KNCU in exporting cocoa from Ghana and coffee from Tanzania respectively, highlight the importance of the link with Fair Trade organizations for the development of business and technical skills, especially for enabling these co-operatives to provide transparent market information (Bora, 2004).

4.3. Efforts to Improve Coffee Quality

Based on coffee household characteristics and performance, constraints, opportunities, in can be concluded that coffee quality in Ngarip has a potency to be improved. To realize this, some strategies and efforts have to be implemented. Moreover, this strategies and efforts can also be duplicated in other regions by some adjustments to adapt local specific business environments and regulations. These strategies and efforts could be very complex and multi facet. However, this study identifies some strategies and efforts that should be prioritized.

1. Raising the issue of low quality coffee problems to national level.

   As mentioned before, improvements of coffee quality require supports from all stakeholders of coffee industries. This issue must be lifted at national level to make all stakeholders aware about the problems so that the issue can be perceived as a common enemy. By this, they are expected to give more substantial contributions to solve the problem. The actions of sugar farmers are good examples of raising their issues to attract more substantial supports from the government. The Government has important role in regulating the industries to a better performance. The government can contribute on imposition of a more tight coffee quality standard, provision of soft loan to farmers and even improvement of infrastructure to reduce cost of transaction. Importers and traders can contribute by providing fairer price and bigger market for better coffee qualities. This strategy can be realized by increasing communication to all stakeholders by various forms of media, such as seminars, workshops, meetings, and publications in media mass.

2. Increasing farmer motivation and believe

   As mentioned, farmer motivation to achieve to achieve their desires and believe that better coffee farming and quality can be an instrument to achieve their desires, are two important factors that have a significant contribution for coffee quality improvement. Therefore, these factors have to be used as a mean to improve coffee quality. This can be done through formal and informal farmer's organizations forum. Extension officers, formal and informal leaders, can use the forum to lift farmers motivations and believe that they have to able to identify their

desires and believe that the desires can be achieved through better coffee farming and quality.

3. Creating fair price for better coffee qualities.

As discussed before, fairer price for better coffee qualities is a must. If markets can provide sufficient price incentives to better coffee qualities, the farmers will produce as much as the demand. Other constraints, such as insufficient of family labor, insufficient cash money, technical risks, are considered as non-permanent constraints. Discussions with farmers, collectors, and extension officers show that the farmers will produce coffee with better quality as long as the price premium is attractive. The farmers stated that they would be able to overcome all constraints if the price premium is sufficient.

The results of financial analysis provide some alternative premium and fairer prices for better coffee qualities (Table 14). This analysis is basically based on opportunities cost of producing better coffee qualities (Nestle coffee) and reward (price premium) for better quality.

Scenario 1. Similar profit margin as producing *asalan* quality (break-even).

This scenario is basically farm household approach in which family labor costs are not valued as costs. Under this scenario, the minimum price premium for producing Nestle quality is 13.5 per cent, depending on the proportion of off-grade coffee as the results of producing Nestle coffee.

Scenario 2. Break-even + cost of family labor.

This scenario is basically used firm approach so that all cost, including family labor cost, is considered as cost. Under this scenario, the premium prices range between 21.1-23.1 per cent. For example, if the off-grade coffee is 20%, then the premium price for Nestle quality is at least 23.1 per cent higher than that of *asalan* coffee.

Scenario 3. Break-even + cost of family labor + quality premium.

This scenario is based on firm approach and considering the risk of applying new technology of appreciation of applying new technology. New technology is generally bear technical, economic, and social risks so that

industry applied new technology is generally place this risk in the production costs. Assuming that the normal premium for the risks ranges from 20-40 per cent per annum, a common profit margin for a firm, then the premium is equivalent to 10-20 per cent per six moths. Under this assumption, then the prices premium range from 33.6-35.6 per cent.

Table 14. Price premium alternatives for better coffee quality

Scenario		
	Minimum	**Maximum**
Similar profit margin as producing asalan quality (Break –Even)		13.5
Break-Even + cost of family labor	21.1	23.1
Break-Even + cost of family labor + quality premium 10%	33.6	35.6
Break-Even + cost of family labor + quality premium 15%	39.9	41.9
Break-Even + cost of family labor + quality premium 20%	46.1	48.1

Assumptions:

1. Farm size 1.4 ha
2. Yield per picking I, II., III are 256 kg, 395 kg, 295 kg per 1.4 ha
3. Price of off-grade coffee is 50% lower than that of *asalan* coffee

Besides considering the price premium, time of payment for the farmers should also be considered. Discussions with farmers show that the maximum time lag between delivery of coffee and repayment has not exceeded 7 days. Farmers cannot afford any delay in payment to be more than 7 days because they have to use their money for various purposes. In the payment is too late, then the farmers will borrow from collectors and we come up with interlocked market situation.

4. Expanding Market for Better Coffee Quality

Some buyers, such as Nestle and Indocafco have provided markets for better quality coffee with relatively fairer prices. However, the size of the markets has been limited and farmers considered as a main constraint to expand the volume of better quality. As mentioned before, the existence of the coffer market is a must. Thus, efforts to create these markets are key factors to improve coffee quality in Indonesia. Individual and farmer organization generally have no capacity to create and access the markets. Under this circumstance, mediator institutions, such as

government institutions and private institutions could have a better access to these markets. For example, ICCRI has a good contribution in linking farmers and buyers. In Bali, ICCRI has supervised farmers to improve coffee quality in two regions, namely, Kintamani for Arabia and Pupuan for Robusta. More importantly, ICCRI has linked the farmers in the two regions to the buyers so that market for better quality coffee is not a constraint. In the future, this kind of role should be also conducted by local government officers and private organization.

5. Provision of credit

   Insufficient cash money has caused most farmers are in an interlocked market situation that block the farmers to improve their coffee quality. To break this in vicious circle, credit availability is a determining factor. Under the new government that is likely to have a higher attention to agriculture in general, the provision of soft loan for farmers is expected to increase. For example, in 2005 Department of Agriculture will provide soft loan of around Rp 1.3 billions for farmers, especially poor farmers.

6. Empowering farmer organization

   The results of analysis show the importance of farmer organization in coffee quality improvement. Therefore, the weak farmer organizations in Ngarip have to be empowered by training on management/organization, negotiation, and capital supports. ICCRI has good and long experiences in empowering farmer organization.

7. Development of fair trade for coffee

   This is n a long-term perspective effort. However, this has to begin because thus avenue can have a significant improvement in term of coffee quality and farm income of smallholder in developing countries.

CHAPTER 5
CONCLUTIONS AND POLICY IMPLICATIONS

5.1. Conclusions

Based on previous discussions, there are some conclusions that can be derived as follows:

1. Coffee plays important crops in Ngarip because more than 92 per cent of the farmers depending on coffee as the main source of their income, attaining to around 70 per cent of total income. However, their income is low so that Ngarip is considered as a poor village with average income around Rp 5.6 per household per year, below poverty line of Rp 6.4.
2. Coffee marketing systems in Ngarip can be considered as traditional marketing system, involving collector traders, and exporter. The total margin in collector, trader, and exporter are 13.6, 8.5, and 7.6 per cent respectively, while farm gate price is around 75.9%. If the farmers produce Nestle coffee, the farm gate prices are at least 81.2 per cent.
3. There are two common payment systems, namely, cash and carry and loan system. Loan system is the most common of repayment system that cause farmers has to sell their coffee to the collectors that give loan to them (interlocked market). Under this condition, bargaining position of farmers in term of price and quality is relatively low.
4. There are four techniques of coffee processing in Ngarip, namely, traditional/Java, Semendo A, Semendo B, and Nestle. Java technique is the most common technique (68 per cent) applied in Ngarip because most coffee farmers in Ngarip are transmigrant from Java. In addition, around 90 per cent of farmers use non-selective technique (*petik asalan*) in picking their coffee cherries.
5. Except for Nestle technique, the coffee qualities are very low with 19.43 per cent of moisture content (MC) and coefficient of variation (CV) is round 13%. The average defect value is 210 with CV even higher of 92 per cent. For Nestle coffee, the MC is 12 per cent maximum and the defect value is 120.

6. Although the coffee processing techniques applied by farmers in Lampung are very risky to OTA contaminations; the results of analysis indicate that the OTA contaminations of coffee at farm level in the region are relatively low, below the limit applied of the EU (5 ppb). The average OTA contamination at farm level is 0.74 ppb; even 9 samples out of 20 have no OTA contamination. The maximum OTA contamination found in the coffee samples is 2.7 ppb. At trader level, the average OTA contamination is even lower, that is 0.36 ppb
7. Considering the processing technique and MC contents, the most risky chain for OTA contaminations is at farmer level, followed by collector and trader.
8. Based on farmers perspectives and regression analysis, there are some inter-related constrains and problems associated to the decreasing quality of coffee produced by the farmers, namely, (i) technical barrier (44% of farmers), (ii) technical-production risks due to pests and thieves (29%), (iii) insufficient family labor ((46%), (iv) lack of capital and cash money (96 per cent), (v) interlocked market (49), (vi) insufficient price incentive for better coffee quality (78%), (vii) limitation of market size for higher coffee quality (73).
9. There are some factors that could effect to quality improvement in term of MC, namely, (i) the believe of farmer that coffee farming and quality improvement could help farmer to achieve their desires/dream, (ii) welfare level of the farmer; (iii) source of information; and (iv) availability of family labor.
10. Factors that significantly affect defect value are (i) the participation of farmers in farmer's organization is a key factor; (ii) decision-making process of the farmers (level of interaction); (iii) the number of desires of farmer; (iv) welfare level of farmers; and (v) farmers' experience.
11. There are also some opportunities in improving the coffee qualities in the regions, namely, (i) high motivation of most farmers (95%); (ii) believe on important role of coffee to achieve their desires (90%); (iii) good knowledge of coffee farming and quality; (iv) quality improvement to gain value added; (v) OTA issue as a common enemy; and (vi) fair trade for coffee.

5.2. Policy Implications

Coffee quality in Ngarip and other areas in Northern Sumatra have a potency to be improved by adopting or adapting the Nestle system. Based on the current situation, obstacles and opportunities, this study identifies some strategies and efforts that should be prioritized to improve the coffee quality.

1. *Raising the issue of low quality coffee problems to national level.*

   To get supports from all stakeholders, the issue must be lifted at national level to make all stakeholders aware about the problems so that the issue can be perceived as a common enemy. This strategy can be realized by increasing communication to all stakeholders by various forms of media, such as seminars, workshops, meetings, and publications in mass media mass.

2. *Increasing farmer motivation and believe on the role of coffee improvement*

   Farmer motivation to achieve their desires and believe that better coffee farming and quality can be an instrument to achieve their desires, are two important factors that have a significant contribution for coffee quality improvement. Therefore, these factors have to be used as a mean to improve coffee quality through formal and informal farmers organizations forum.

3. *Creating fair price for better coffee qualities.*

   Fairer price for better coffee qualities is a must. The results of financial analysis provide some alternative premium and fairer prices for better coffee qualities.

   Scenario 1. Similar profit margin as producing asalan quality (break-even).

   Under this scenario, the minimum price premium for producing Nestle quality is 13.5 per cent, depending on the proportion of off-grade coffee as the results of producing Nestle coffee.

   Scenario 2. Break-even + cost of family labor.

   Under this scenario, the premium prices range between 21.1-23.1 per cent. For example, if the off-grade coffee is 20%, then the premium price for Nestle quality is at least 23.1 per cent higher than that of *asalan* coffee.

   Scenario 3. Break-even + cost of family labor + quality premium.

   Under this assumption, then the prices premium range from 33.6-48.1 per cent higher than *asalan* price.

Besides considering the price premium, time of payment for the farmers should also be considered. Farmers cannot afford any delay in payment to be more than 7 days because they have to use their money for various purposes.

4. *Expanding Market for Better Coffee Quality*

   The size of the markets of better qualities has been limited. Considering the weakness of individual and farmer organization to create and access the markets, mediator institutions, such as government institutions and private institutions could have a better access to these markets. ICCRI could play an important role in this aspect. In the future, local government officers and private organization should also conduct this kind of role.

5. *Provision of credit*

   Insufficient cash money has caused most farmers are in an interlocked market situation that block the farmers to improve their coffee quality. To break this vicious circle, credit availability is a determining factor. Under the new government that is likely to have a higher attention to agriculture in general, the provision of soft loan for farmers is expected to increase.

6. *Empowering farmer organization*

   The results of analysis show the importance of farmer organization in coffee quality improvement. Therefore, the weak farmer organizations in Ngarip have to be empowered by training on management/organization, negotiation, and capital supports. ICCRI could play an important role because it has a good and long experiences in empowering farmer organization.

7. *Development of fair trade for coffee*

   This is n a long-term perspective effort. However, this has to begin because thus avenue can have a significant improvement in term of coffee quality and farm income of smallholder in developing countries.

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