EXECUTIVE SUMMARY

ENHANCEMENT OF COFFEE QUALITY THROUGH PREVENTION OF MOULD FORMATION

(Socio Economic Report)

NATIONAL CONSULTANT REPORT

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FOOD AND AGRICULTURE ORGANIZATION

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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).

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Targeted Investigation of Robusta Coffee Processing and Marketing Chain in Lampung

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 contries

Investigation of the Feasibility of Wet Processed Robusta by Smallholder Farmers in East Java

With total area of 92,741 Ha, East Java has been on of the main coffee production center in Indonesia. Malang and Jember Sub-District are two main coffee regions in East Java. The government of East Java has placed coffee industry as one of main agribusinesses in the region. Garahan Village is one of main coffee producing centers in Jember Sub-District. Unfortunately, farm income of coffee farmers in Garahan is not optimum due to low productivity (840 kg coffee bean /ha) and inefficient and imperfect market situation causing farm gate price is only around 70-85 per cent. As a result, most farmers' income is relatively low, around Rp 4.5 – 11.6 million/household.

A strategic measure to overcome these complex problems is by changing the coffee processing system/technique, from dry process (DP) to wet process (WP). This measure is considered to be strategic because its direct impact on farm gate price and income. The idea of changing on processing was inspired by the success story of coffee farmers in Pupuan, Bali. The farmers in Pupuan under supervision of ICCRI and local government institutions, made a contract with a buyer, to improve their coffee quality to gain a higher prices. The prices of WP coffee gain a 50 percent higher price compared to coffee processed using dry process.

Before this idea can be implemented, a study to assess the feasibility of this change is crucial. This study is intended to assess the feasibility from some aspects, such as technical, management and organization, market, and financial aspects. The results of this feasibility study could be used as basis whether the change from dry to wet process can be implemented in Garahan.

Following this, the objective of this study is to assess the feasibility of implementing wet process of coffee in Garahan, East Java. The feasibility is assessed based on technical, management and organization, market opportunity, and financial aspects.

The method used in this study is basically financial analysis. However, to get a more comprehensive features of the coffee industry in Pupuan and Garahan, some technical, coffee quality and processing and marketing aspects were also elaborated. For

this reasons, coffee quality analysis, processing techniques, and marketing performance were also analyzed. Coffee samplings were taken from farmers and collectors/traders and interviews were conducted with almost all stakeholders of coffee industry (farmers, traders, collectors, government officers).

The results of the study show that wet process has been successfully adopted by coffee farmers in Pupuan, Bali. Five key factors were identified as the key success factors of the adoption, namely, (i) market access and fair price guarantee, (ii) intensive and consistent supervisions, (iii) effective farmer organization; (iv) strong and effective leadership, and (v) local government supports. By now, there are four types of coffee processing techniques in Pupuan, namely, dry process, semi-wet process, wet process, and wet process without washer.

Coffee qualities produced by farmers in Pupuan are medium, as indicated by its defect value and MC. The average defect value at farm level was about 99 with coefficient variation of 43 per cent. This implies that the variation of defect is relatively high. Around 35% of sample have defect value to be less that 80, while 41 per cent having defect between 80-120. Around 23 per cent have high defect value of more than 120.

MC of coffee produced by DP technique in Pupuan indicates that the MC is moderate; it is better than that in Lampung (19 per cent) but worse compared to that in East Java (13 per cent). The average MC was of 14.7 per cent with low coefficient of variation of 9.7 percent. Although collectors claimed that they do some processing activities (re-drying and sorting), the results are marginal. Their activies only reduced MC from 14.71 to 13.50 with defect values are almost the same. Thus, the quality of coffee has been strongly affected by processing techque applied by farmers.

Six samples of DP coffee and 4 samples of WP coffee in Pupuan were analyzed. The results of analysis show that OTA contamination of DP coffee is very low with the average of 0.14 ppb. The highest OTA contamination is 0.31 ppb while the lowest is 0.01 ppb. For WP coffee, no OTA contamination was found. This means that OTA contamination for WP and DP coffee in Bali still below the standard stipulated by the EU.

The adoption of wet process has a significant impact on coffee industry in Pupuan. The adoption has caused an improvement on coffee quality, indicated by lower moisture content, defect, and no OTA contamination. With price guarantee of Rp 7,500/kg in 2004 harvesting season, which was around 50% higher that of DP coffee, farm income has

increased, although some farmers still perceived that this price incentive is not sufficient yet.

Coffee quality in Garahan is relatively good. In terms of defect, the average value was 64.2, much lower than 80 as an indicator of good coffee quality. More than 55 per cent of coffees have defect value to be less than 80, while around 44.4 per cent have defect value ranging from 80-120.

Similarly, the average MC is also low, that is 13.04 per cent, very close to the good coffee standard of 12 per cent. Around 22.2 per cent of samples have MC to be less than 12 per cent, while the rest are more than 12 per cent. However, coffee quality in the regions is varied, indicated by its high coefficient of variation of defect value of 50 per cent.

OTA contamination is not found in coffee samples of Garahan, East Java. The results of OTA analysis shows that all samples have zero OTA contamination. Thus, various DP techniques applied by the farmers in East Java have no any problems related to OTA contamination.

With similar characteristics, coffee farmers in Garahan, East Java have indicated a high interest to adopt wet process (WP). To evaluate the feasibility of the adoption, four aspects of the adoption were assessed, namely technical, managerial and organization, market, and financial aspects. Technically, the adoption of WP in Garahan is feasible. Farmers in general have a high interest and sufficient skills, although their skills related to WP process need to be improved. However, the specification of the machinery that is suitable to the farmers, is not identified yet

From managerial and organization perspective, the adoption of WP in Garahan is likely to be successful. Similar to farmer organization in Pupuan Bali, the existing farmer organizations have functioned well by incorporating financial, social, and religious values in laws and rules. However, their capacity in planning and reporting has to be improved.

From market perspective, the adoption of WP in the region is likely to be constrained by market size with price guarantee. Under the current prices, the supply was estimated around 1,800 tons, while the current demand was estimated around 300 tons, although another estimate indicates that the market can reach to be 2,000 tons.

Financially, the adoption of WP in Garahan is feasible. Under the current price of WP coffee and some price scenarios, financial feasibility indicators (B/C of profit margin)

indicate that the adoption of WP in Garahan is feasible. The potential problem related to financial aspects is of capital and cash money.

Some policy implications that can be derived from this study are as follows:

1. Based on technical consideration and farmers aspirations, the most likely WP machineries to be adopted by farmer group in Garahan have the following characteristics: (i) *medium size* (ii) *mobile*; (iii) *using a motor as source of power*; and (iv) *integrated pulper and huller*. Moreover, the capacity of farmers in terms of quality improvement technology has to be improved. Technical feasibility of development WP process in the region will be strongly depending on the availability of the machineries that have those characteristics. ICCRI should have a critical role in developing these machineries and increasing farmers' skills on technology improvement.
2. In term of management and organization, the farmers in Garahan still need some training and supervision, especially on planning, reporting and effective leadership.
3. Considering the potential supply and demand of WP coffee in Garahan, it can be concluded that there is still market for the coffee, but limited. This implies that the development of production has to be managed carefully to avoid over supply. In other words, the production schedule has to follow the potential market that has been clearly identified.
4. Since the size of the markets has been limited and farmers considered as a main constraint to expand the volume of better quality, then 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 ICCRI and government institutions and private institutions could have a better access to these markets.
5. In negotiating price of WP coffee in Garahan, two price scenarios are proposed. The first is called break-even + cost of family labor. This scenario is basically used firm approach so that all costs, including family labor costs, are considered as costs. Under this scenario, the premium price is 33 per cent. The second scenario is called break-even + cost of family labor + quality premium. This scenario is based on firm approach and considering the risk of applying new technology

(appreciation of applying new technology). Under this scenario, the prices premium range from 37-52 per cent.

6. 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.

Targeted Study of the Coffee production Chain in North Sumatra Arabica (Mandheling Coffee)

North Sumatra Province is known as one of the Arabica producing center with the production of 15000 tons/year, accounting to 33.3% of the Indonesian Arabica production. There are three main districts in North Sumatra producing the coffee, namely Humbang Hasundutan, Tapanuli Utara and Toba Samosir. The North Sumatra coffee harvest, trading and processing season occurs during the wet season. As a result, coffee is initially traded from farmer to local trader at very high moisture content (MC), between 40 to 50 per cent. This condition causes a dilemma; on one hand, coffee produced by this system produces a unique coffee typically described as having complex body and low acidity (Mandheling coffee). This coffee is appreciated for its organoleptic characteristics with a significant price premium. On the other hand, the processing and trading system that yields coffee with very high moisture contents, theoretically is very risky associated with coffee quality, mould formation, and OTA contamination.

The best solution for this dilemma is to develop processing and trading systems that maintain the organoleptic characteristics of the coffee and at the same time minimize the risks associated with physical coffee quality and mould formation. In response to this problem, a study to identify the systems was conducted. The objectives of the study are: (1) to define, describe and verify the key steps in the processing and trading system of typical Mandheling coffee; (2) to identify points in processing and trading system where there is risk of OTA contamination (3) to propose further studies and sampling which will help identify areas to reduce the risk of OTA occurrence, but retain the specialized flavor developed by this wet process and trading system. This study is preliminary study and the comprehensive studies are conducted by the Indonesian Coffee and Cocoa Research Institute (ICCRI).

A survey in three Districts namely, Humbang Hasundutan, Tapanuli Utara and Toba Samosir District, was conducted to describe and verify key steps in the processing and trading system. Discussions and observations were conducted at farmer, collector, trader, and exporter level.

Coffee processing techniques applied for Mandheling coffees in North Sumatra are varied, basically depending on the regions. There are three main groups of the processing

based on regions/locations, namely Tapanuli Utara, Humbang Hasundutan and Toba Samosir system. Besides their differences, all systems basically consist of seven steps, i.e.: picking, floating, pulping, fermentation, washing, drying, and storing. The best system was found in Humbang Hasundutan district where almost all processes are properly conducted.

The variation of processing techniques applied by farmers can be explained by some factors. Following the main stakeholder of coffee industry in the districts (farmers, collectors, and traders) there are five main determining factors affecting the selection of processing technique, namely, (i) market demand (ii) tradition; (iii) demand for cash money; (iv) limited family labor; (v) wet weather condition.

According to the perceptions of exporters, traders, and collectors, good Mandheling coffee is characterized by its (i) strong aroma; (ii) big size; (iii) clean and bright; and (iv) gray to blue color. The valuation of exporters, traders, and collectors indicated that coffee from Dolok Sangul and Lintong Sub-district are perceived as the best coffee in the three districts. Coffee from Siborong-Borong, Pangribuan, and Gurgur sub-districts are perceived to have medium grade and coffee from Muara and Paguluran are perceived to have the lowest grade.

Considering that OTA contaminations will occur when the MC is higher than 14 per cent, it can inferred that drying, storing, and marketing are risky steps to OTA contamination. During the drying, storing, and marketing, the coffees are very wet with 40-50 per cent MC. This implies that during these steps, the condition of coffee is favorable to OTA contaminations. However, exporters in Medan have not been complaint due to OTA contaminations. Japan as on of the most critical countries on coffee qualities has not showed any complaints associated with OTA contaminations. Therefore, exporters in Medan have not aware about the contaminations.

There is no wide variation in marketing system and channel. The main actors in each region basically consist of farmer, collector, traders, and exporters. System of payment is mostly cash and carry so that the interlocked market conditions are not as a common feature in the marketing system.

Marketing system of Mandheling coffee in North Sumatra is rather unique, compared to that in other coffee producing regions in Indonesia. This is characterized by (i) the transactions are mostly done at Sub-district or district market; (ii) Mandheling coffee traded are wet bean (wet parchment) with MC ranging from 40-50 per cent; (iii) coffee

bean is measured in term of volume (liter), not in terms o weight (kg); and (iv) market day for coffee is fixed and regular for each sub-district.

Although there are so many farmers (sellers) and buyers in the markets, and farmers can freely market their coffee, the position of farmers tend to be price taker. The prices of coffee are mostly determined by exporters in Medan through their traders and collectors as price determining agencies. In general, this market structure is very close to olygopsony market. The prices of coffee vary depending on the quality. Based on processing technique applied and origin, collectors and traders distinguish coffee qualities and coffee prices.

Market performance is relatively efficient as indicated by the relatively fair profit margin gained by collectors, traders, and exporters and high farm gate price. The profit margins range from 2.8 –3.8 per cent of FOB price while farm gate price is around 86.4 per cent.

Latitude, soil properties, humidity, and processing technique are perceived as the main determining factors of Mandheling coffee. However, this is just perceptions of main stakeholders that have not been supported by scientific evidences yet.

Based on the results of the study, three recommendations are proposed:

1. Since coffee processing techniques applied in the regions are varied amongst sub-districts, the best techniques (Dolok Sanggul and Lintong Nihuta system in Humbang Hasundutan) could be promoted to be adopted or adapted by other regions. One key factor to realize this is by providing higher price incentives for coffee processed using Dolok Sangul and Lintong Nihuta. To realize this, the local government of North Sumatra has to stipulate quality standards for Mandheling coffee using Dolok Sangul and Lintong Nihuta coffee as refernces.
2. Since the factors affecting the quality, especially on organoleptic characteristics, have not been identified scientifically, further research to identify the factors must be prioritized. Organoleptic characteristics are the competitive advantages of Mandheling coffee. Latitude, soil properties, humidity, processing techniques, storing, and marketing could be used as the hypothesis factors that have to be scientifically tested.
3. In more specific, further research focused on processing techniques are crucial. This research must be focused on development of processing techniques that can

keep the organoleptic characteristics of Mandheling coffee, while OTA contamination can be minimized. Seven main steps of the processing techniques need to be studied in order to find out the key steps (picking, floating, pulping, fermentation, washing, drying, and storing) that have significant influences on organoleptic characteristics and OTA contaminations.