THESIS REPORT

EVALUATION OF MARKET SYSTEM AND MARKET INTEGRATION FOR RUBBER CULTIVATION IN JAMBI PROVINCE- INDONESIA

By :

Zakky Fathoni

Reg. No. 810908237100

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Abstract

The purpose of this research is to analyze market system and market integration for rubber cultivation in Jambi Province Indonesia. The institutional and functional approaches are used in order to analyze rubber market system that includes characteristics of market, marketing channel, and the role of stakeholders in analysis. For further analysis, marketing margin and price analysis are also used to analyze the price differentiation from the producer's level to consumer's level. In order to analyze integration in rubber market, Augmented Dickey Fuller (ADF) test is used to ascertain that the variables are exact order of integration. After co-integration test, Error Correction Model (ECM) is used to identify that market price of peripheral price on main market price and vice versa. Results of analysis show that rubber market in Jambi Province is characterized as monopolistic competition with the existence of many traders in rubber market. From the marketing margin analysis, it shows that margins at every stage of marketing are positive that implies there are additional marketing services to maintain the quality of rubbers. For the market integration, the analysis indicates that variables are stationary and co-integrated both in Jambi and Malaysia rubber prices, and there is causality in at least one direction from Malaysia to the price in Jambi auction market.

Chapter I. Introduction

Background

Rubber is an important product for the people in the world. Based on data from the International Rubber Study Group (IRSG) (2007), the consumption of the natural rubber in the world is increasing from 9, 22 million tons in 2006 to 9, 72 million tons in 2007. The increase of the world oil price in international market affects the demand of natural rubber. The demand of natural rubber increases because the cost for making the synthetic rubber is increasing as the effect of the price of oil fraction to produce the synthetic rubber is also increasing.

IRSG stated that in the long term, supply of world natural rubber will decrease. It is not only caused by the world demand of natural rubber that increases rapidly but also caused in two of the three biggest natural rubber producer countries which are Malaysia and Thailand. They have high economic growth and might become the new generation of New Industrial Countries (NICs) and will move away from the natural rubber agribusiness. Indonesia as the rubber exporter after Thailand is expected to meet the supply of world natural rubber. Production of natural rubbers in main producing countries is described in Table 1.

Table 6 Production of natural rubbers in main producing countries

Countries	Production (in thousand tons)									
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Thailand	2031	2076	2155	2346	2320	2615	2876	2984	2937	3137
Indonesia	1505	1714	1599	1501	1607	1630	1792	2066	2271	2637
Malaysia	971	886	789	928	882	890	986	1169	1126	1284
India	580	591	620	629	632	641	708	743	772	853
China	444	450	460	445	478	527	565	573	510	533
Vietnam	212	218	262	291	313	331	364	419	469	554
Libera	67	75	100	105	107	109	107	115	111	101
Brazil	61	70	87	88	88	89	94	101	107	108
Srilanka	106	96	97	88	86	91	92	95	104	109
Philipinnes	66	68	65	67	71	76	84	80	79	74

Source : Indian Rubber Statistics(2007)

Based on Table 1, Indonesia is the second largest producer of natural rubber in the world after Thailand. In 2006, Indonesia has produced 2.637.000 tons of natural rubbers with average

production of natural rubber since 1997 until 2006 was 1.832.200 tons per years. Indonesian natural rubber production has showed a positive trend from 2001 onwards. Indonesia contributes 28% of the total world production while Thailand has the biggest contribution as big as 33%. Figure 1 shows the percentage of main producing countries in the world natural rubbers.

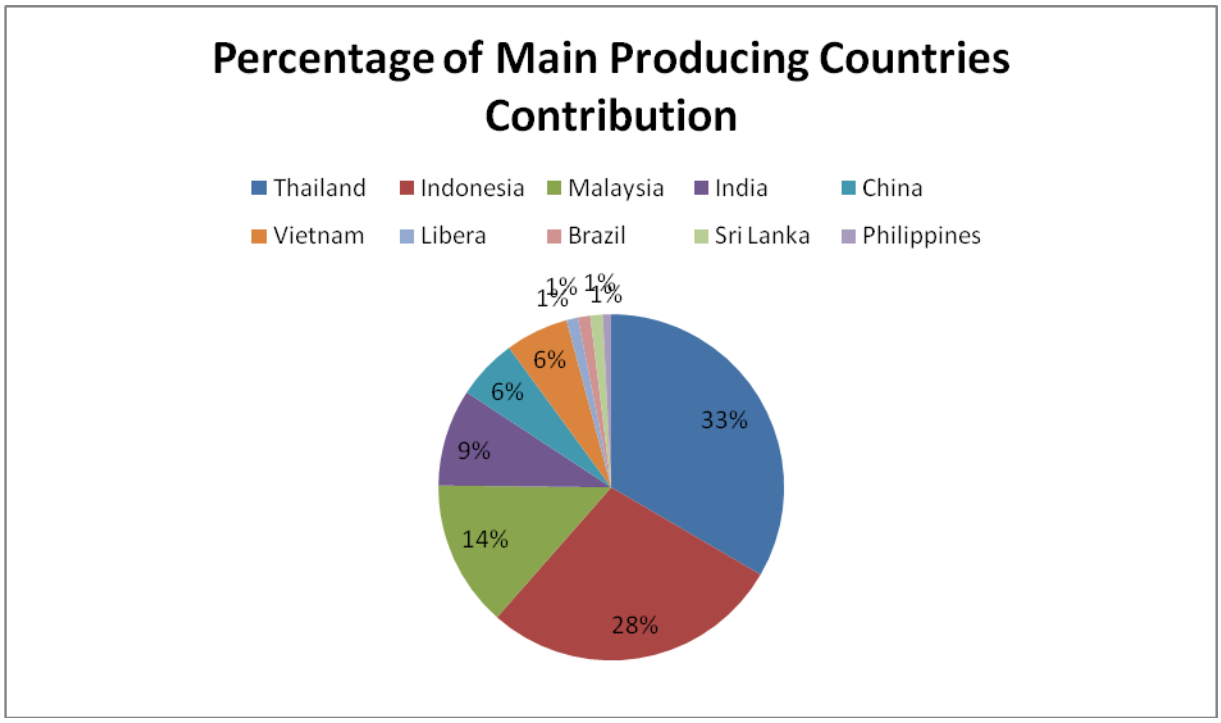


Figure 2 Contribution of main producing countries

Price, Production, and Consumption of Natural Rubber

Concerning in the price, until the second quarter of 2008, the natural rubber price was €1.944/tons or US$3.144 for TSR20 (International Rubber Study Group 2008). This high price was caused by the consumption of natural rubbers that is higher than production. The consumption of natural rubber until second quarter of 2008 was 2.270.000 tons, while the production of natural rubber was only 2.227.000 tons. High demand of natural rubber will influence the price of natural rubber. Table 2 shows the price and consumption of world natural rubber.

Table 7 Production, Consumption, and Price of World Natural Rubber

	2006 (‘000 tonnes)	2007 (‘000 tonnes)	2008 (‘000 tonnes)	
			Q1	Q2
Natural rubber production	9701	9712	2528	2227
Natural rubber consumption	9251	9789	2435	2270
Natural rubber prices				
- Europe, TSR20 €/ton	1646	1619	1830	1944
- New York, TSR20, US$/ton	2213	2321	2821	3120

Source: IRSG (2008)

Rubber Cultivation in Indonesia

The history of Indonesian rubber reached its peak in the period after World War II until 1956. At that time, Indonesia became the largest exporter of rubber in the word. Since 1957, Indonesia’s position as the largest producer of rubber in the world was taken over by Malaysia. Nevertheless, rubber is still important for the Indonesia’s economy.

Rubber has been known in Indonesia since the era of Dutch Colonial. Firstly, rubber was planted in Bogor Botanical Garden (*Kebun Raya Bogor*) as collection. Next, rubber has developed and spread in some areas in Indonesia. Indonesia became the biggest producer of natural rubber in the rubber international market after World War II. The high demand of natural rubber in the international market is fulfilled from Indonesian rubber. Nevertheless, the position as the main producer of rubber in the world was not followed with good support. Insufficient plantation management, less areal enlargement, and the replanting of old rubbers had become the problem of rubber plantation at that time.

In Indonesia most of the rubber production nowadays is produced by smallholders while government estates and private estates only take small part of its. The smallholders’ rubber is being planted on 85% of the rubber planted area. GT1, the Indonesian own clones with a yield potential around 1.350 kg/ha is largely used in the smallholder plantation. It also should be noted that some 1 to 1,5 ha can be more properly considered as “jungle” rubber, i.e. abandoned but which can be tapped in short term. Poor plantation maintenance and thoroughly insufficient replanting has resulted in average yield in the country around 450 kg/ha. Some of the large estate sectors have yields of around 1.320kg/ha (International Rubber Study Group 2005)

The Indonesian government made several attempts to help rubber smallholder to increase their productivity. Before the 1970s, the government strategies towards smallholders consisted of assistance to individual farmers by giving subsidized fertilizer, pesticides, inputs, and also by giving the credits to the farmers. At the end of 1970s the government made new attempts with further external assistance to establish holdings for landless people. The main objective of this external assistance is to set up self-reliant, sustainable agriculture in newly developed area. The participants are trained and supervised to cultivate their plantation in a productive way. By doing so, the farmers are responsible for their own tapping and they also have to repay a loan for receiving the holding.

The other approach by the Indonesian government was The Project Management Unit. This approach consisted of two programs which are SRDP (Smallholder Rubber Development Project) and PRPTE (*Peremajaan Rehabilitasi dan Perluasan Tanaman Ekspor* or Undertaking for the Rehabilitation and Expansion of Export Crops). These programs involved farmers owning land from very beginning, so the farmers received a lot of knowledge and they know how to apply the knowledge in the field (Burger 1994).

Concerning in processing technology, rubber with thick slab specification is still dominated in the rubber production area. Thick slab is the result of rubbers coagulation and has dry rubber content between 45-52%. Before 1969, Indonesia was one of the smoked sheet exporter countries and many rubber products such as blanket and crepe. These products were directly produced from the farmers although with low quality. In order to improve the quality of rubber, Indonesian government made a program that was known as Group Coagulating Centre. This program introduced join processing program by using hand mangle. Indonesian government also made a project to develop smallholder processing unit by introducing product processing unit to the farmers in the production area.

Rubber plays at least five important roles in the Indonesian economy that pushes economic growth through positive backward as well as forward linkages. First, rubber is the income source of a substantial number of rubber smallholders. Second, rubber is one of the promising business investments by large scale companies such as state-owned companies. Third, rubber is an agro industrial development corner stone. Fourth, rubber is used as a foreign exchange generator. Indonesia currently constitutes the second largest rubber producer and exporter after Thailand. Last, rubber is as a market for urban-industrial product and services, either for family consumption or for farm cultivation (Hadi 1997).

As the source of income, rubber has important contribution to Indonesian development. Until 1998, rubber still became the biggest source of income from plantation subsector with US$1.1 billion, but in 2003 it became the second source of income after palm oil as big as US$ 1.4 billion (export of palm oil reached US$ 2.4 billion). In 2005, source of income from rubber

commodity reached US$ 2.6 billion or around 5% from total non oil gas income (Department of Agriculture 2007)

More than three decades (1970-2005), rubber plantation areas in Indonesia has increased around 1.27% per year but the growth only occurs on the rubber smallholders as big as 1.6% per year, while the private and state plantation has declined. With plantation area around 3.3 million hectares in 2005, the majority rubber plantation in Indonesia is the smallholder plantation which is the source of income for more than 15 million people. The growth of plantation area in Indonesia during period 1970 and 2005 is shown in Table 3.

Table 8 Growth Level of Plantation Area in Indonesia 1970 and 2005

Description	Area (000 ha)	
	1970	2005
Smallholder plantation	1,613	2,767
State plantation	281	224
Private plantation	238	275
Total	2,318	3,280

Source: (Department of Agriculture 2007)

Whereas the growth of plantation area was relatively low, the growth of natural rubber production during 1970-2005 was around 3.89% per years. It is caused by the plantation area used the superior clones which has higher productivity was also increasing. Nevertheless, the productivity of smallholder plantation is relative lower if compared with the productivity of state plantation or private plantation. The low productivity of smallholder plantation is caused by the use of seedling without good care, and higher proportion of rubber plantation area that is already old, damaged, or immature. At this time around 400 thousand hectares of plantation area are not productive because of old and broken condition. Every year, 2-3% of productive areas of rubber need to replant (Department of Agriculture 2007).

Jambi's Rubber Plantation and Phenomena

Jambi Province is one of the natural rubber production areas in Indonesia. In 2007, the total area of rubber plantation was 636,907 hectares with total production was 264,674 tons. The area of rubber plantation spreads in all regions in Jambi Province and consists of smallholding plantation (259,695 hectares) and private plantation (5,318 hectares) (Plantation Department 2008). Table 4 shows the area and production of rubber in Jambi Province.

Table 9 Area and Production of Rubber Plantation in Jambi Province 2007

No	Rubber Plantation	Plantation Area (Ha)				Production	Productivity
		Immature	Mature	Damaged	Total		(kg/ha)
1	Smallholder plantation	145,260	334,449	151,830	631,589	259,695	776
2	Private plantation	-	5,318	-	5,318	4,979	936

Source: (Plantation Department 2008)

Rubber plantation has been grown by the farmers in Jambi Province by generations. Therefore, rubber plantation has become part of the cultural community in Jambi. In 2007, the numbers of family farmers who take the rubber plantation are 235,888 heads of families that spreads in almost all areas in the province Jambi. In addition, rubber plantation is a significant contributor to the economy of Jambi Province. Export volume of rubber in Jambi has increased around 10%, from 127.4 thousand tons in 2004 to 140.2 thousand tons in 2005. This growth is expected to increase continuously because there is an increase on the world rubber demand which is estimated will reach 10,6 million tons in 2015 and 15.03 million tons in 2035 (Indonesia 2007). Table 5 shows the rubber export in Jambi Province during period 2003-2005.

Table 10 Rubber export in Jambi Province 2003-2005

Years	2005	2006	2007
Export (USD)	208,886,735	458,681,899	5,293,838,055,973 (in Rupiah)
Volume (kg)	130,185,583	127,432,918	140,176,209
Value/Export (USD/kg)	1.6	3.6	37,765.6 (Rupiah/kg)

(Plantation Department 2008)

Although rubber plantation has significant contribution to the economy of Jambi, in the other side the role of rubber to increase welfare of the farmers is still not significant. Internally, it has found many problems in smallholder plantation such as low management skill of the farmers, low quality of rubber that is produced by the farmers, small financial assets of farmers, and

inefficiency of rubber market system. In smallholder plantation, the management and technique of rubber plantation is still done in a simple way. After the rubber seeds are planted, farmers just leave the rubber trees without adequate treatment and cause the low productivity and quality of rubbers production.

Related to the quality of rubber, most of the small farmers use the jungle rubber that was already old in their plantation. Jungle rubber was an important source for the smallholder farmers particularly for the poor farmers. However, due to increasing land scarcity, the productivity of rubber was not sufficient to meet the new expenses of family members. As most farmers still rely on ageing jungle rubber with low productivity, they face the need to improve their plantation though a process of intensification by using superior clones (Penot 2001).

Quality of the product is one of the aspects in agricultural marketing. In the market liberalization regime, quality of product gets an insufficient attention especially for the crop product. The quality of product becomes less control, less effective, and overall the quality of products decline. With the absence of any control in the market will make an error in valuing the product, where the high quality product will be undervalued, and the low quality product will be overvalued (Chalfant and Sexton 2002; Tollens and Gilbert 2003)

Concerning to the rubber market system, the inefficiency of marketing channel becomes the main problem of smallholder plantation. Basically, the government has tried various ways to protect rubber's farmers particularly for smallholder so they will be in more profitable position. Generating auction markets in the centre of rubber production areas is an example of government intervention for helping the farmers to receive better price of natural rubbers. Auction market that follows the principle of competition among buyers is expected to give the price according to the product. But, actually the auction market was not yet fully able to help the farmers as the price taker in the rubber market system.

The other phenomenon in the rubber market system is the strong bond between farmers and sellers. In general, the owners of rubber plantation those have large area and use some workers by using share cropping system act as the village level trader. In the other hand, they also have the other business for providing the needs of laborers and the other farmers. The existence of this seller for the farmers is really helpful because they could get financial support or the family needs in the short time period. As consequence, farmers tend to be morally bound so in the rubber transaction farmers have no bargaining position and always be price taker.

Although the government has implemented many programs to develop the plantation sector, it did not prove for life of rubber farmers. It is caused by the program is focused on increase of the production without support of the other factors such as market, infrastructure facility, and stability of the price.

The increase of the productivity of rubber has a positive effect on rubber production. Nevertheless, there is also another thing should be improved, not only the production but also the market of rubber. Marketing in agriculture is defined as the performance of all business activities involved in the flow of products and services from the point of initial agricultural production until they are in the hand of consumers. The study of agricultural marketing is concerned with the efficiency of the use of the resource in processing, handling, and distributing food, fibers, and other agricultural products (Padberg 1997).

Farris (1997) stated there are three categories of agricultural market analysis, (i) the application of structure/ conduct/ performance analysis (the idea of effective competition), (ii) the analysis of marketing margins, and (iii) the analysis of supply and demand relation and the explanation for price movement over time and space.

The application of market structure refers to the characteristics of the market which affect the trader behavior. The market conduct refers to the pricing policy and practice designed to stabilize market relationship and reduce the significance of the price competition, and the market performance analysis is evaluated in relationship to its structural condition and conduct with regard to pricing and product policy (Stifel 1975).

The analysis of marketing margin has tried to find out the difference between the prices that consumers pay for the final good and the price received by producers for the raw product (Gail L. Cramer 2001). Marketing margins provide neither a measure of farmer's well-being nor of marketing firm. On the other hand, marketing margins give an indication of the performance of a particular industry (Tomek 1990), or an indication of the market structure and efficiency. Margin analysis reflects the premium received by producers and traders in providing quality and value added services as demanded by downstream customers. It also indicates the costs incurred in meeting customers' requirements. Therefore marketing margin analysis can be used to examine the inefficiency in the marketing chain (Digal, Elcana et al. 2006).

This research analyzes the market system of the rubber by using the common approaches in the marketing analysis. There are three common approaches which are the functional, the institutional, and the market structure (Gail L. Cramer 2001). The functional approach is used to determine the activities performed in getting rubber from producer to the consumer. The activities performed in rubber market system are: (i) exchange – buying and selling activities, (ii) physical-processing, storage and transportation, and (iii) facilitating-standardization, financing and market information.

The institutional approach is used to examine the activities of farmers or organization involved in rubber marketing system such as farmer organization, village traders, until the exporter organization. These organizations perform the operation necessary to transfer goods from the producer to consumer, because of the benefit of specialization and scale that exist in marketing

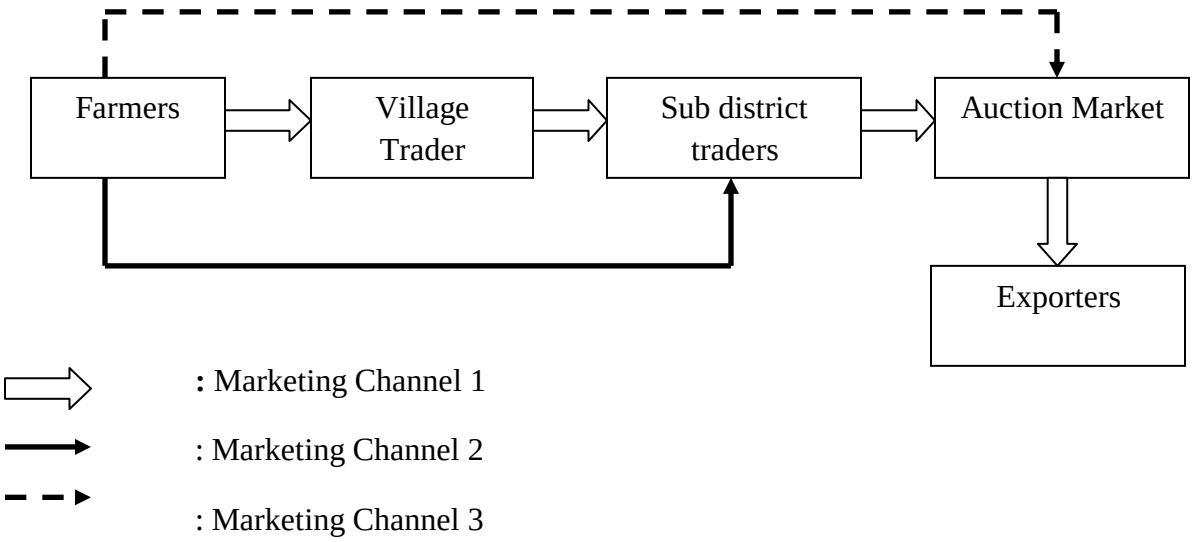
as well as production. The institutional approach also considers the nature and character of the various traders or middlemen and related agencies and also the arrangement and organization of the marketing activities.

Market structure analysis emphasizes the nature of the market competition and attempts to connect the variables of market performance to the types of market structure and conduct. Performance of the market reflects the impact of the structure and conduct on prices, costs, and the volume and the quality of the input. Market structure analysis plays an important role in making decision of the environment. The extent and the characteristics of the competition in the market affect choice behavior among the actors (Baumol 1961; Yadav 1995).

This study also analyzes rubber market integration and price transmission along marketing chain. Concerning to the market and co movement of the prices in rubber cultivation, time series econometric analysis will be employed. This technique is chosen because it includes co integration and error correction model which has become the standard tool for analyzing spatial relationship, replacing earlier empirical tools, such as the bivariate correlation coefficient and regression (Abey P. Philip 2008).

Problem Statement

There are several problems in rubber plantation, particularly for the smallholding farm in Jambi Province. The efficiency of marketing channel has become the main problem for smallholding farming. There are many marketing channels which can be described in rubber market. First, farmers sell the product to the village trader, from village trader the product is sold to the district trader, and then from the district trader, it is sold in the auction market. From the auction market, rubber is bargained by either the crumb rubber factory or the exporters. Second, farmers sell the product to the sub district trader, and then from district trader it is sold in the auction market. From the auction market it is sold into the crumb rubber factory and exporters. Finally, farmers bring the products directly to the auction market and sell it to the factory and the exporters. The chart of the rubber market chain is described in the flow chart.



Based on the market channel, most of farmers in Jambi Province take the channel 1 and 2 as their marketing channels and only the small numbers of the farmers take the channel 3. The reasons of the farmers for taking these market channels are they need the money to meet the needs of their household. They also have to pay the credit for the farm input to the bank or traders. The farmers could sell their rubbers directly to the village traders directly after they take the sap of the rubber without drying it first. The consequences that farmers have to receive for using these channels are a small share and an excessive marketing margin.

The other problems are also found in the rubber market is the transparence of price of rubber at farmers level. It is due to the weak bargaining position of farmers that is caused by inability of farmers to understand the calculation of dry rubber content. As the result, the price of rubber is determined unilaterally by the buyers and the selling price of rubber is difficult to increase. It is also related with the behavior of farmers who cannot produce the rubber with better quality. The phenomenon that occurs at this time is the farmers mix the rubbers with the skin of rubber tress which exfoliate at the time of tapping.

Efficiency of rubber market in Jambi is also influenced by the rubber markets are still not integrated. Non-integrated market may transmit wide of the picture about the price information that might twist production decision. It also leads to low production and stagnant growth. Although the price in the world rubber market is changed, it does not have large effect to the domestic market due to high transportation cost and large marketing margin that hamper price transmission of rubber.

Competition among traders in the auction market has also become the problem in the rubber market system. Farmers did not want to sell their rubber to the auction, because there is no competition among traders, therefore the price of rubber remains low. In the other side, the

buyers from the rubber-processing industry not interesting to buy rubber through the auction market because the value of rubber is too small. Meanwhile, less buyers from rubber processing industry encourages the other traders to buy rubber from the auction market. The involvement of the other traders causes the farmers did not receive the feasible price.

All of these problems that occur in the rubber plantation and the rubber market must be immediately solved so that the farmers will no longer stay in a weak position and get the feasible price of their rubber production. Therefore an evaluation on rubber market system in Jambi Province is needed to find out the solution of these problems.

Research Objective and Research Question

General Objective

- To evaluate the rubber market system and market integration in Jambi Province

Specific Research Objectives

- To evaluate the role and function of the stakeholders that involve in rubber market system
  - What are the current activities along rubber market system in Jambi Province?
  - What are the characteristics of the rubber markets in Jambi Province?
- To analyze the marketing margin and the farm gate price along marketing channel in rubber market system
  - How is the marketing margin along the marketing channel of rubber?
  - How is the price of rubbers and what are the variables that affect farm gate level?
- To analyze integration of market between the world rubber market and local rubber market of Jambi Province?
  - What are the variables which influences market integration of rubber?
  - How is the degree of market integration with special reference to price of rubber in Jambi Province?

Data Collection

Site Selection

The selected representative districts for this research are Bungo District, Tebo District, Bangko District, and Batanghari District which is located in the territory of Jambi Province. The main reason for this selection is that these districts have high production of natural rubber in Jambi. In these areas, the smallholders of rubber represent the rubber monoculture and the rubber agro forest area.

The other reason for selecting these areas is that the rubber market also has been developed in these areas but the system of the rubber market still needs more improvements.

Respondent Selection

Respondent of this study consists of rubber farmers, village traders, wholesalers, and rubber factories or exporter retailers. For the farmer respondent, particularly there are two type of rubber farmers namely rubber monoculture and rubber agro forest. The total population of rubber farmers in Jambi Province is 235.888 and spreads on 9 districts of Jambi Province. The condition of the farmers is almost homogeny, based on the area, quality, and rubber production. Due to the homogeneity, it is not necessary to take the respondent as much as possible. Respondents are the individual or family of farmers Respondent for the farmers will be chosen randomly from each village in 4 districts. First, the village is chosen randomly by listing all villages in each districts base on the information from district government. After that, data of all farmers in each village is collected and written down in a small paper. Then, the name of farmers is chosen by picking up the papers randomly until 50 respondents are fulfilled.

For the traders, there are two types of traders namely village traders and wholesalers. Village traders are traders that collect and buy the rubber from the local farmers and then sell it to the wholesalers in the capital of district or province. The wholesalers are the big traders or companies who buy rubber from village traders and sell the rubber to the exporters or rubber factory. Five respondents of the village districts will be taken from each district

The last respondent of this study is the auction market. The auction market is the market where the local buyers or exporters can buy the variety of rubber from wholesalers or from farmers. After they purchase the rubbers, it will be processed into the crumb rubber and exported to the other countries.

Data Sources

For exploring and analyzing the set of objectives above, the set of questionnaire is used to gather the information from the farmers, village traders, wholesalers, and exporters. The questionnaire for the farmers consists of farmer identity, area of rubber plantation, area status, and total

production of rubber. The questionnaire also includes the technique of the farmers to manage their plantation, and the marketing of rubber. For the village traders, wholesalers, and exporters, it consists of the identity of traders, the activity of traders which includes the purchase and sale of rubber. The additional questionnaire also provides the questionnaire for the community leaders to get the deep insight of the rubber market in Jambi Province. The following sources of data will also need to support this study:

- Data of supply and demand of rubbers since the replanting program of rubbers is launched by government. This data comes from Department of plantation and agriculture, and also Department of Trade and Industry.
- Data of rubber farmers in Jambi Province from Department of Plantation and Agriculture.
- Data of rubber auction market that is still existing and active. It will be useful to identify and to trace the suppliers and buyers that involved in the auction market.
- Data of rubber price from Department of Trade and Industry.
- Literature review on previous work related to the field under study.

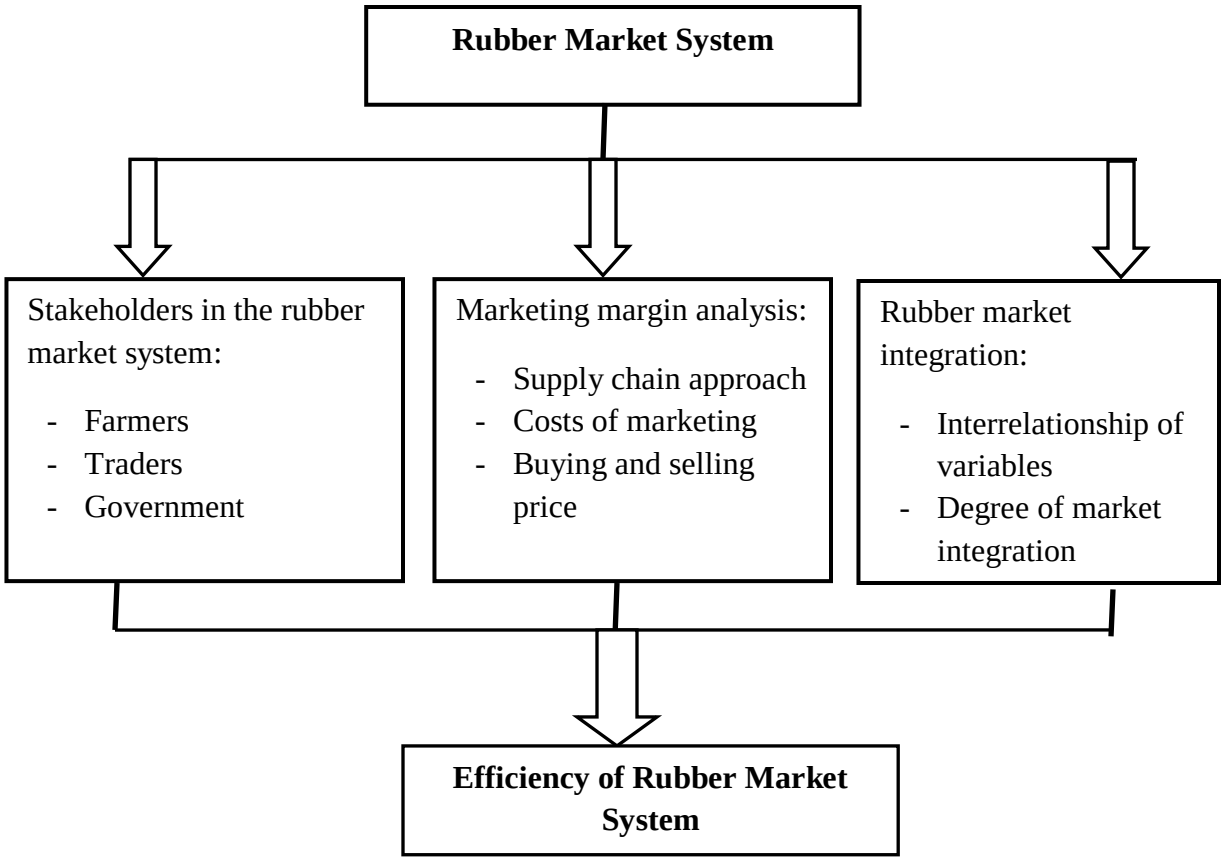
Conceptual (Theoretical Framework)

Several factors influence the rubber market system. These factors consist of roles and functions of the stakeholder in the rubber market, marketing margin and price transmission analysis, and the integration of the market. Stakeholders that involve in the rubber market include the farmers, the traders, auction market, and also the government as the policy maker. Each stakeholder plays their role in the market. In order to analyze the role and the function of stakeholders, i will use two approaches that are the functional and the institutional approach. The functional approach will examine all the activities of stakeholders and performance the operation necessary for transferring product from the producer to consumer. For the institutional approach, it considers the nature and the characteristic of the various traders, farmers group and organization, and also includes government's roles in the rubber market.

Concerning to the marketing margin, this research tries to analyze the difference of price between the consumer's price and the producer's price. This research will use the supply chain approach to analyze the marketing margin. The supply chain of rubber will be divided into 4 levels where the farmers are on the first level, the village and district traders are in the second level, the auction market is in the third level, and the exporters or the rubber factories are in the fourth level.

The efficiency of the marketing margin will be attained when the price that is paid by the consumers sufficiently returns marketing costs and differences in product form and quality. After analyzing the marketing margin, the responsiveness of the price across the marketing channel will also be analyzed by estimating the coefficient from selling and buying prices and also including the cost of marketing.

This study also analyzes the market integration concerning to the prices in the world rubber market and the local market. Before analyzing the market integration, the interrelationship between variables should be determined by using Granger test. Following step is the analysis of market integration by using the time series data of prices. This study will use the theoretical knowledge and previous work by A.P.Philip (2008). However, unlike with the study by A.P.Philip (2008), this study will compare the price between the world market and the local market and try to analyze the influence of the world rubber price to the local price in Jambi Province.



Chapter II: The Role and Function of Stakeholders

Background

In the marketing system there are many stakeholders that involve in the market activity. The stakeholders are starting from the farmers as the producer of the output, trader, and government as the policy maker in the market. All the stakeholders must accomplish many specific tasks which contain in two general aims. First, they have to determine demand and changes in demand for products. Second, they have to consider the efficiency in the marketing process by improving pricing and operational efficiency (Gail L. Cramer 2001).

Marketing is defined as the performance of all business activities involved in the flow of the products and tend to be the value that is added on to farm output (Kohls 2002; Malcolm, Makeham et al. 2005). Marketing also consists of those efforts that effect transfer of ownership that effect transfer of ownership that create time, place and form utility to commodities (Gregory J. Scott 1995; Gail L. Cramer 2001).

In a market economy, every scarce commodity commands a price, and the price is determined by the demand and supply of products. A large number of other suppliers also detect and respond to changes in demand for the products or services. In a competitive system, producers will increase the output as response to higher prices because by doing so they can improve their earning. It is the motive of profit that makes the market system work.

The study of marketing involves various approaches, but there are three common approaches that are used in the marketing study. First, the functional approach studies marketing in terms of the activities that are conducted in getting farm products from the producer to the consumer. By using this approach, it is feasible to analyze the activity and to compare them against others doing the same job or against standard of performance. Second approach is the institutional approach which examines the activities of business organization or people involved in marketing. The effectiveness of marketing institution depends on the involvement of the relevant stakeholders in the market. The third approach is the market structure approach that emphasizes the nature of market competition and attempts to relate the variables of market performance to types of market structure and conduct.

Analyzing the functions of the stakeholders that involve in the market is particularly helpful to evaluate the marketing costs. Functional approach is also useful in understanding the difference of marketing cost of various products. There are three characteristics of the marketing function. First, the function of the market affects not only the cost of marketing product but also the value of products to the consumers. Second, it is not possible to eliminate marketing function but it is possible to eliminate the middlemen that involve in the market system. The last characteristic of marketing function is that they can be performed by anyone and anywhere in the market system (Kohls 2002).

In a commodity system approach, the functional and the institutional analysis are based on the identification of marketing channel. The analysis of marketing channel is focused on providing the knowledge of the flow of the goods and services from the farmers as the producer to the final destination or consumers (Gregory J. Scott 1995; Gail L. Cramer 2001).

Concerning to the rubber market in Jambi Province, there are many stakeholders that involve in the market. As the first link in the marketing channel are the farmers that cultivate rubber and supply it to the second marketing agent. Rural traders are the second link that collect rubbers from the farmers and combines all the rubbers on one location. Wholesalers are the next level in the marketing channel. They focus on the various, intermediate-size loads and put the product into larger and uniform units. For the next level is the auction market where the rubber is collected and sold by wholesaler to the rubber exporter and factories, in this level rubber is already graded based on dry content and dirty content of rubbers. In the auction market, the exporter will offer the price to the wholesalers or the farmers. After they agree with the price, the rubbers will bring to the storage or processing factory.

Farmers have been often found to react to price level and to the price change in particular. The change in the price of rubber will influence the activity of rubber. The general assumption related to the price and the activity of the farmers and other stakeholders is that an increase in the price level leads to larger supply of rubber through the more intensive tapping and more rubbers are sold in the market. In the other side, a decrease in the price level may as an exception induce farmers to tap more rubber and for the traders have to supply more rubber because they have to maintain their income at appropriate level.

The cost and profit is not only the focus in agricultural marketing, particularly in rubber marketing. The form and quality of rubber also become the concern in rubber marketing. Most of the rubber's farmers produce the rubber with the low quality without adequate treatment. Meanwhile the exporters and the factories have the standard of rubbers based on the dry rubber content and the dirty content of the rubbers. The low quality of rubbers make the price of rubber that is received by farmers gets lower.

Related and Previous Study in Roles and Function of Stakeholders

There are many theories and related study in roles and function of stakeholders in the agricultural market, especially on analyzing the marketing relationship (Gail L. Cramer 2001; Kohls 2002; Sheth and Parvatiyar 2002). The focus of marketing research has experienced on several phases, from a commodity phase (agricultural product, manufacture good and services), to institutional (producers, marketing intermediaries), to functional (buying, selling, and promoting product), to managerial (planning, organizing, analysis, and controlling) and to social (market efficiency, product quality, and social impact) (Siskos, Matsatsinis et al. 2001).

In the marketing analysis, the functional approach is important to analyze that there is an engage between stakeholders in the market behavior. When producer and consumer directly deal with each other, there is an emotional bounding that goes beyond economic exchange. They can appreciate the needs of each other and constraints better, thus it becomes more relationship oriented. Contrary with the middlemen orientation (buyers and sellers), the economic exchange is more important. Therefore, they are less emotional attached to the product(Sheth and Parvatiyar 2002).

Vargo and Lusch (2004) pointed that there is a shift in marketing orientation. Marketing is not only the exchange of tangible goods, but it also the exchange of intangible goods such as skills and knowledge. Marketing studies are not primarily garnering the profits from individual, in the large sense, marketing studies are also used to accomplish and to design social effectiveness that would move goods with a minimum of time and efforts (Wikkie and Moore 2003).

Gabre-Madhin (2001) analyzed the trader behavior in Ethiopians grain wholesaler. This research found that the weak public market information, the lack of grain standardization, the oral of contract, and limited legal contract enforcement increase the risk of commitment failure. It also investigated the norms and the rules underlying relations between the traders and brokers reveal in the long term. Concerning to the institutional approach in the marketing behavior, this study found that the institution emerges to minimize the transaction costs in the market and to facilitate the market exchange.

In order to minimize the cost and to facilitate the market exchange, the sufficient infrastructure is also needed in the marketing system. Market infrastructure that consists of the transportation facility, market facility and other facilities influence the farmer's choices to sell the product. Concerning to the transportation facility, Shilpi and Umali-Deininger (2008) stated that farmers will tend to choose the nearest market to reduce their transportation cost.

Another approach that is also used in the marketing system is the institutional approach. This approach determines the actors that involve in the market and the accent shifts to the institutions involved in the marketing process. Van Zyl (1988) mentioned that the institutional structure for marketing could be used in solving three basic problems in marketing, namely consumer's demand, the price system, and the methods or practices used in exchanging title and getting product from producer to consumer in the form they are required, at the time and place desired.

There are still many gaps remaining in the institutional marketing analysis. Relatively little institutional research has addressed the role of intermediaries in facilitating exchange between producers and consumers. There is only little attention has been given to transaction cost analysis where the economic agents tries to find each other in the market. Less empirical studies in the institutional analysis have attempted to measure the transaction cost quantitatively because of the difficulty to get the data of the transaction costs (Gabre-Madhin 2001).

Following the literatures and previous studies, this research tries to analyze the role and the function of stakeholders and institutions by looking at the contribution and the activity of the actors in the market. This research also tries to examine the implication of the presence of the institution in the market in order to minimize the transaction cost that occurs in the market.

Methodology

This study covers all the stakeholders that involve in rubber market activity which are the farmers, traders, auction market, and government. By using the questionnaire, all the data and information from each stakeholder is collected. After all data and information are collected, qualitative methodology is used to investigate and to analyze the role and the activity of stakeholders in the rubber market.

There are two approaches that are used to investigate the activities in the rubber market:

- Functional approach; determine all the activities of getting rubber from producer to the consumer such as exchange activities (selling-buying), physical processing, and facilitating. The use of functional approach in the rubber market is particularly helpful in evaluating marketing cost of rubber. There are many stakeholders that involve in the rubber market such as farmers, village traders, wholesalers and exporters. The marketing costs are different among the stakeholders because the stakeholders do not perform the same function in the rubber market. The marketing function also affects the value of rubber products from producers to consumers.

- Institutional approach; examine performance and contribution of the farmers organization that involve in rubber market. This approach is also used to examine the presence of the village traders and wholesalers in the rubber market. The institutional approach will focus attention on the way transactions of rubber are organized and will analyze what will be happened if the traders are eliminated from the rubber market system. The institutional approach in the rubber market also involves analysis of the power participant in the vertical coordination process. This involve of the power participants defining the distribution of control and the rules which permit this distribution to subsist in the market system.

Result and Discussion

Overview of Rubbers' Farmer Activities

Generally, most of farmers in Jambi Province still use traditional methods for cultivating the rubbers. For the rubber seeds, many farmers still use the local seeds which could not be recognized the clones and could not produce rubbers as high as the superior clones. These conditions make the productivity of rubber in Jambi Province still remains low. Generally, there

are five steps in smallholder plantation that consist of land clearing, planting, maintaining, tapping, and marketing of rubber product.

Land clearing is the first step in rubber cultivation. From the interview with 200 farmers, 180 farmers (90%) do the land clearing by using the slash and burn methods although there are still many farmers do not do the land clearing. Slash and burn methods are considered as the efficient way for cultivating immature trees together with the annual crops because it will become easier for farmers to plant and to maintain those crops. These methods are used by the farmers for opening the new plantation in which there is no plantation has planted in the area before. The activity for land clearing needs 2 until 4 months before the area is ready to plant.

The following activity in rubber cultivation is planting the rubber seed. From interview with farmer's respondent, 137 farmers (68,5%) use the local seed while 63 respondents use the seed that is given from the local government. There are several steps that must be done before the rubber seeds are planted in the area.

First, rubber is seeded for 3 until 4 months and after that the rubber seeds are ready to be planted. Second step is planting the seed of rubber which is done in rainy season (October until March). For putting down the seed, farmers made a hole with the distance between the holes around 4x4 m or 5x5 m. The third level is the maintain process. In this process farmers still use the simple methods which are by weeding the weeds or the grass that are grown around the rubber trees. The weeding process has two types which are the cleaning weeding and circle weeding. The cleaning weeding is the weeding that includes all the planting area, while the circle weeding is the weeding process only around the rubber trees. In the maintaining process, farmers also putted fertilizers three months after the seeds were planted. The common fertilizers that are used for rubber cultivation are Urea and TSP. Another activity that is also done in maintain process is pest and disease control. The pests that commonly attack rubber plantation are wild pigs, deer, and monkeys. For the disease, white root fungus (*Rigidoporus lignosus)* and *Cortcium samonicolor* are the commonly disease in rubber plantation. In order to handle the attack of pest and diseases, farmers use the traps and fungicides based on the recommendation from the agriculture officer in their village.

The fourth step in rubber cultivation is harvesting process. There are two activities that is done in this step which are the tapping process, and the printing process. Tapping activity is the most important activity in rubber cultivation. From the interview with the respondents, 95 farmers (47,5%) start to tap the rubbers when the rubber trees after 6 years it has been planted, 45 farmers (22,5 %) start to tap the rubbers trees after 5 years, and 60 farmers (30%) start after 7 years. Farmers tap the rubber latex in the morning start from 7-11 am, and in the afternoon from 2 – 4 pm. Based on the information from farmers, they tap the rubbers 3-4 times a week and it depends on the weather condition. For the tapping type, there are two types of tapping that are V

and ½ S types. For the V type, latex is tapped from up left to bottom right and from up right to bottom left. While for ½ S types, latex is tapped only from the up right to down left.

From the interview with farmers, the average production of rubbers in research area is around 200 kg/ha/ months. The quantity of latex is influenced by the area of rubbers, number of trees, tapping frequencies, and age of rubbers. After the tapping process, all the latex is collected into the boxes for printing process. In this process, there are many tools and materials that are used by farmers such as the printing boxes, coagulate acid, and water. For the printing boxes, many farmers also made traditional printing boxes to reduce the cost by making the square holes in their land and after that all the latex is putted in each box. For printing the latex into slab, farmers use simple method where after all the latex is putted into boxes, it mixes with coagulated acid and water. Related to the coagulated acid, farmers usually used *asam semut* or *cuka gentong* and spent 2-3 bottles of those acids. After few hours, all the latex has printed into pieces which are called as slabs. Weight of slabs varies between 30 kg-100 kg it depends on the size of box. Before the slab is sold, it is often soaked in the river to increase the weight of slabs.

The last activity in rubber cultivation is marketing. In this activity, farmers put their slab in front of their plantation before it will be picked up by traders to the market. Traders that come to rubber plantation are the village traders, or district traders. There are also many farmers that sell their slab to village cooperation.

In general, farmers consider the easiness of transportation for selling their slab to the traders. Beside the easiness of transportation, there are also other factors that also influence farmer decision such as the price of slab, and loans from traders. The price that is given from each trader will vary and it depends on the weight and dry rubber content. In this case, farmers only become as price takers while the traders decide the price of rubber (price setter). For estimating dry rubber contents, traders only look at the slab based on the thickness of rubbers without using tool that could estimate the dry rubber content correctly. Because of this condition, most of the farmers still put the dirty materials (*tatal*) into the slabs for increasing the weight of rubbers.

After checking all the rubber, farmer will get the price from the trader. If he agrees with the price, all the rubber will be measured and load into the truck. The average price of rubber in the level of farmers is Rp.4.919,-/kg.

There are three components of costs which farmer has to spend in marketing his rubber. First, the coagulated material cost as big as Rp. 29.875,- / month or Rp. 64, 78/ kg/ month. Coagulated material is used for rubbers after they are tapped from plantation and printed in the box. Second, the labor cost. Farmer has to pay the labor for tapping and loading rubbers. It is paid to the labors per working day. The average of labor cost is as big as Rp. 38.810,-/ month or Rp. 80, 47/ kg. Third, the transportation cost. Farmers pay the transportation cost to traders because for transporting their rubbers, farmers use trader's truck or motorcycle. This cost is counted based on

the quantity of rubbers, the average transportation cost in the level of farmers is Rp. 33.150,-/ month or Rp. 71,84/ kg.

Overview of Farmer Institution

There are many farmer institutions that involve in rubber cultivation and activities, starts from providing input until marketing activity. Focusing on marketing activity, there are many roles of farmer institution in rubber marketing such as providing the information related to the price of rubber to the farmers therefore farmers can reduce the transaction cost and gain more profit from their production.

Most of the farmers in research area become a member of farmer's group and village cooperation. From interview and survey in research area, at least there are 10 farmer's groups where in each farmer's group consists of 15-20 members. In order to become a member of farmer's group there are many requirements that have to fulfill by the farmers such as farmers have to own land at least 0,5 ha, farmers have to pay the monthly fee as big as Rp. 10.000, and they have to follow all the rules and regulation in farmer's group.

Based on the interview with the farmers that become member of family groups, they mentioned that there are many benefits that they can get from the group. First, from the group they can get the information and knowledge to increase and improve their rubber plantation. Every month, farmer's group makes a meeting with all members to discuss about their problem and if there are many problems that could not be solved, they try to invite the agriculture officer from local government. Second, by becoming member of farmer's group, they can help each other for tapping latex and thus they can reduce the labor cost for tapping. Third, concerning to the price of rubber, there are many farmers group that provide information about the price of rubber so farmer knows how much the price of rubber in the market. The information of the price is very important because by knowing the price of rubbers they can make bargaining with the traders.

Another institution that also exists is the village cooperation. This institution involves in the activity for providing the inputs for farmers (fertilizer, fungicides, superior seeds, and others), giving the loan to cooperation members so they can improve and increase their rubber production, and helping and facilitating the farmers for selling and buying activity.

Nowadays, the existence of village cooperation is decreasing. It is caused by farmers do not believe the committee that manages the cooperation. From the interview with farmers, they mentioned that the committee in village cooperation made a lot of mistakes in their work. The committee didn't transparence to the member about the profit that should be informed and be given to all cooperation members, but in fact they just give the money to each member without explaining the financial condition of village cooperation.

Overview of Traders Activities

In rubber marketing, trader has an important role as intermediary for transferring rubbers from farmers to consumers. In this research, there are three types of traders that consist of village traders, sub-district traders, and district or province traders. The village traders are the traders that live in the same village and they collect the rubbers directly to farmer's plantation after tapping period. Sub-district traders are the traders that live in the same sub-district with farmers but in different village. They come to rubber plantation directly or to the collecting place in village usually once a week. District or province traders are the traders from the other districts that come to the plantations or to the auction markets to buy the rubbers. Usually, the district traders come to the plantations one or two days before auction market's day.

In general, there are several activities that have done by traders in rubber market. First, collecting activity where traders come to the plantation and buy rubbers directly from farmers. In rubber plantation, traders look up the rubbers and check dry rubber content of rubbers. For checking dry rubber content, traders do not use specific tools to measure dry content. With this condition, dry content of rubbers could not be specified correctly and make the price of rubbers become lower. When traders check the condition of rubbers, they also look at the dirty material content inside the rubber, because sometimes farmers put many dirty materials into their rubber to increase the weight. If traders found many dirty materials inside the rubbers they will reduce the price of rubbers to the farmers.

After checking the condition of rubbers, trader will offer the price to the farmer. If farmer agrees with the price, trader measures total weight of rubber and transfer all the rubber into the truck. Trader will pay money to the farmer base on total weight of rubber and reduced with the transportation cost.

Second, product storage is the activity where the rubber that just bought from the farmer keeps in storage place. Rubber will be kept in order to increase the dry rubber content before the rubbers are brought into the auction market. Trader keeps the rubber in the storage for 5-6 days and it is able to increase average dry rubber content into 54%. In this research, traders have their own storage so they do not have to spent money for storage cost.

The third activity is selling the rubber to the auction market or rubber's exporter. Based on the information from traders, every twice a month they bring and sell rubber to the auction market. In the auction market, rubbers are bargained by the province traders or the factory. Concerning to the price of rubbers, it is decided consider to dry rubber content. Although there is no tools for measuring dry rubber content in auction market, traders already have the information from the auction committee or from their colleague. Therefore, it is difficult to the buyer for cheating or declining the price of rubbers. The average price of rubber in the level of traders is Rp. 6.435/kg with the average dry rubber contents is 54%.

Related to the marketing costs, from the interview with 40 traders, there are three components of costs which consist of the loading cost, transportation cost, and retribution cost. For the loading cost, trader has to spent Rp. 73.080,-/ month or Rp.30,50/kg/month. In loading activity, trader uses the labors from outside that are paid based on the loading capacity in the storage. For the transportation cost, trader has to spent Rp. 69.900,-/month or Rp. 27,35/ kg. The distance between the storage and the auction market becomes the main factors to the high transportation cost. The other cost that is also spent by traders is the retribution cost. The average retribution cost is Rp. 42.500,- / month or Rp. 25,02/ kg. Retribution cost is the cost that is paid to government officer when trader's truck brings the rubber to the auction market.

Overview of Rubber Auction Market

Auction market is the market where all the rubbers from traders and farmers are collected and selected in order to be offered to buyers. The activity of auction market is held twice a month by the auction committees from the rubber cooperation in Jambi Province. There are several procedures in the auction market:

- Rubber auction is done twice a month (in second and fourth week)
- In the morning around 08.00-11.00 hours traders come to the auction market and put their rubber (mostly in the slab form) in front of the auction market
- The name of the trader is given on the top of the rubbers
- The auction committee from the village cooperative puts the number randomly in the rubbers as the number for the trader.
- Based on the name and the number, the auction committee writes the name and the number of the trader in the blackboard.
- Around 11.30-13.30 hours, the buyers come to the auction market, and then they look, check, and grade the rubber. Finally they decide the price of rubbers.
- The price from the buyers is written in the book, and then it is given to the auction committee. After that, the committee writes the price from the buyers in the blackboard.
- Around 13.30-14.00 hours traders look at the price from the traders for their rubbers in the blackboard.
- Based on the price from the buyers/traders, the farmers can choose to whom they will sell the rubbers by giving the sign in the column of traders on the blackboard (100% of the farmers choose the traders that offer the highest price for the rubbers).
- The trader that wins the auction, call his colleague to prepare the scale and the car for picking up the rubbers.
- The farmer that sells their rubbers to the trader will bring the rubbers to the scale and after they measure the weight of rubber, the rubber is directly putted in the car.
- Based on the weight of rubbers, the farmers get the note from the traders then they could get the cash from the cashier by showing the note.

Concerning to the price decision in rubber auction market, price is decided based on three criteria such as dry rubber content, the dirty material contents, and the soaking process. The valuation and estimation of rubbers are done by the buyer. The valuation process is done by taking small

pieces of rubber or slashing rubbers and sample is observed only by eyes without using specific tools.

Roles of Government in Rubber Market

Concerning to the auction market activity, based on the observation there is less or no control from the local government to the auction market. Government only involves in informing the price of rubber to the auction market, but this information becomes not useful for traders and buyers because they already had information of price from the other sources.

Although government only has less control in the rubber market, government plays an important role for making policy related to the smallholder plantation. There are many policies that already made and have done by the government such as:

1. Monetary and fiscal policy. In this policy government try to stimulate and to encourage for the growth and development of rubber agribusiness sectors. Government tries to provide loans for the farmers with low interest rate therefore farmers can increase their rubber production.
2. Infrastructure development policy. Infrastructure becomes an important factor in rubber development, particularly for rubber marketing. In this policy, government tries to build many infrastructures such as roads, ports, electricity, irrigation, and communication facilities.
3. Institutional policy development includes financial institution, research and development, human resource, and the development of farmer's institution and organization.

In order to develop the rubber smallholder plantation, government also tries to stimulate the smallholder plantation by making agriculture revitalization program. This program is an effort to accelerate agricultural development particularly for rubber plantation through expansion, renovation, and rehabilitation of plantation that is supported by the investment support and credit subsidy with or without government involvement as the partner in the development plantation, processing and product marketing. Jambi government has target in 2009, 130.000 ha of smallholder plantation area will be revitalized.

For supporting the programs, government also has tried to recruit more officers and instructors that are employed to help and to work together with farmers in rubber plantation. The existence of instructor for smallholder plantation is very important, but roles of the instructors are still not sufficient to help the smallholder improving their plantation.

Evaluation of Role and Function of Stakeholders

In rubber marketing system, there are three stakeholders that involve in rubber market. Each stakeholder has their role and function in the market. First, farmers as the main producer of rubber those provide the rubbers to the consumers. In Jambi, rubber farmers still use the simple and traditional method for rubber cultivation. The adoption of technology to increase the production and productivity of rubber is little bit difficult for the farmers because of the low education level and farmers behaviors in rubber cultivation. Many farmers is already started to use the superior clones but because of insufficient of treatment makes the production of rubber is still low.

Second, traders are the intermediary between farmers and consumers that buy rubber from the farmers and sell it into the exporters. Generally, there are three activities of traders in Jambi Province consist of collecting, storage, and selling activity. Traders try to buy rubbers with lower price from the farmers, but they try to sell it to the exporters with higher price. In rubber market, traders have bargaining position as the price setter. For setting the price, traders have to check the dry content of rubbers, in this activity the measurement of dry rubber content is still not well measured because of the way of traders still not effective.

Third, exporters are the buyers in the auction market. They come to the auction market to select and buy the rubbers that are offered in auction market. The selection process is based on dry rubber content, dirty material contents, and soaking process and it is measured directly by the exporters. In the auction market, the price of rubber is increasing, due to the high dry rubber content.

In rubber marketing system, the government does not directly involve in marketing activity. Local government only provides the information related to the price of rubbers in auction market, and it becomes basic price in auction market. The local government in Jambi Province also tries to help the rubber smallholder to increase their production by making the agriculture revitalization program as an effort to accelerate agricultural development particularly for rubber plantation. This program is supported by the investment and credit subsidy with or without government involvement as the partner in the development plantation, processing and product marketing.

Chapter III: Marketing Margin and Price Analysis

Background

In the marketing economy, it is also important to consider the marketing margin of the products. The marketing margin is defined as the difference between the price that consumers pay for the final good and the price received by producers for the raw product represents marketing costs. Wohlgenant (2001) pointed out that the margin is influenced primarily by shifts in retail demand, farm supply, and marketing input prices. There are many factors that also influenced marketing margin such as lags time in supply and demand (Gardner 1975; Wohlgenant, Bruce et al. 2001), market power (Schroeter and Azzam 1991), risk, technical change, quality (Tollens and Gilbert 2003), and spatial consideration.

In the marketing margin analysis, price is the integrating force between market levels. If primary demand of product increases relative to supply, then retail price will increase. The higher price is reflected through the marketing system to producers, and the eventual result, other factors remaining the same, is a larger quantity supplied (William G. Tomek and Robinson 1991). Not only related to the price of the product, marketing margin also related to the quality of the products and the value added services which is provided by the producers or traders as demanded by the downstream consumers (Digal, Elcana et al. 2006).

Digal et al (2006) also stated that the term of marketing margin may be defined in different ways. It could be defined either as the difference between two marketing channels, or the collection of marketing services provided along marketing channel. Both of these ways reflect the efficiency of the market and the cost of marketing. The analysis of marketing margin may also provide some insight into the factors affecting postharvest losses.

The magnitude of marketing margin can be influenced by many factors. As pointed by Hadi (1994), these factors include the transportation cost, labor, storage and capital, preference of consumers, economies of scale, state of new techniques in marketing and processing, competition between middlemen, degree of concentration and vertical integration, and bargaining power of farmers.

Following the marketing margin analysis, the price transmission also can be analyzed. There are different perceptions related to the respond of prices. More exactly, the traders in the market tend to pass more rapidly prices to the consumers, whilst it takes longer time for consumer prices to adjust to producer prices if it decreases (Lajos Zoltán and Imre 2005).

Related Study and Previous Research in Marketing Margin

There are many empirical studies and research that try to analyze the marketing margin, either in the agricultural market or in the industrial market. The basic framework of marketing margin analysis was provided by Gardner (1975), it defined the major source of variation in the product

demand, farm product supply, and the ratio of the price and marketing costs. Following the study of Gardner, Heien (1977) did the analysis of farm-retail price by using the Cobb-Douglass function. The result of the analysis showed that an increase in the marketing cost and in the level of farm output reduce the percentage of marketing margin.

Wohlgenant (2001) discussed the marketing margin and the development of empirical models of margin by using complete structural model and reduce structural model. Apart from the variables that were included in the structural model, the study also analyzed another possibility variable that could be included into reduce structural model instead of complete structural model. The variables were retail prices, population and income as demand shifters, and marketing input costs.

Schroeter and Azzam (1991) analyzed marketing margin non competitive food industries facing price uncertainty by developing a conceptual and empirical framework. For developing an empirical framework, this study divided the observing margin into four components that were the marginal cost of processing, price distortions, and risk components.

The analysis of marketing margin is also considered as the interaction between explanatory variables and the specific commodity. Hadi (1994) did the research on marketing margin of pineapples production in North Sumatera Indonesia by analyzing the effect of supply change. It found that the local wholesale and farm price decreased while marketing margin was increased. Increased marketing margin is caused by high transportation cost due to the high demand for transportation services.

Similarly, Digal et al (2006) also studied the marketing margin and price transmission among vegetables farmers in Philippine by using supply chain approach. As the result, they concluded that marketing margin was influenced by increasing demand or decreasing supply of product. They also pointed out that the quality of product also affected the marketing margin. Differences in quality perception between farmers and intermediaries exist, as the quality of product from the farmers is different from the market prefers.

Methodology

For analyzing the marketing margin, this study follows the research method of Digal et al (2006). The supply chain approach will be used to examine margins and efficiency in marketing rubber in Jambi Province. In the case of the rubber supply chain in Jambi Province, the first level is the farm level, while village traders, sub district traders are incorporated into the wholesale one (W1) level. Auction market is labeled as wholesale two (W2), and the exporters as the last level.

Efficiency of the market is achieved when consumers pay the price that sufficiently reflects the cost of marketing and differences in product form and quality. For the marketing margin, it may

be defined as the price between two marketing stages or levels, or the collection of marketing services provided along the marketing channel.

Following marketing margin analysis, the responsiveness of prices across the rubber marketing chain is analyzed. The elasticity of price transmission from one level, for example, farmer to W1, will be derived by estimating the coefficient from selling to buying. The general model is:

$$\boldsymbol{P_B = f\,(P_S, C)} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (1)$$

Where P_B = buying price, P_S = selling price, and C = vector of cost, which includes all the cost that is used for marketing the rubbers. From farm to W1, P_B and P_S refer to the price at W1 and the farm price, respectively. On the other side, P_B refers to the buying price at W2 and P_S refers to the selling price at W1. Similarly, from W2 to exporters, P_B refers to the exporters buying price and P_S refers to the W2 selling price. For the price of rubbers, estimation price of rubber for 100% DRC is used in order to make all prices in different level of stakeholders are in the same degree.

An econometric model relating prices across the supply chain of rubbers is estimated to get the coefficients of the selling price to buying price. The empirical counterpart of equation (1) becomes:

$$P_S = \beta_0 + \beta_1 P_B + \beta_2 \sum_{i=1}^{n} C_i \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (2)$$

Where C_i is the costs of the marketing services include such items as processing, transportation, cost of cleaning, grading, and retailing. These services are classified by time, form, and place utilities.

The model considered levels in the supply chain: farm to W1, W1 to W2, and W2 to exporters. From equation (2), the elasticity of price transmission is:

$$\varepsilon = \frac{\%\Delta P_S}{\%\Delta P_B} = \frac{\Delta P_S / P_S}{\Delta P_B / P_B} = \beta_1 . \frac{P_B}{P_S} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (3)$$

Where Δ means change and variables are as previously defined.

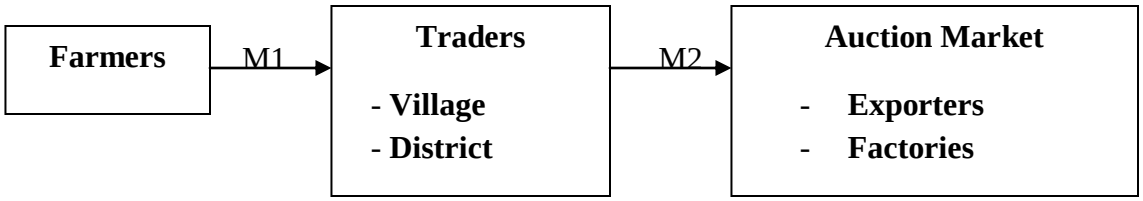
Result and Discussion

Marketing margin in Rubber Market

Price Margin Analysis

Data on prices, volumes, and costs from the survey instrument across 200 farmers, 40 wholesalers and 5 exporters in Jambi Province are tabulated and traced according to level in the

supply chain and dry rubber contents. Price of rubbers across the level from farmers to the traders increased as the rubbers moved from its source to its destination reflecting the cost of marketing. Before analyzing the price and marketing cost, the supply chain of rubber is identified. The supply chain of rubbers is shown in flow chart below.



The price and the cost of marketing in rubber cultivation are shown in Table 6 and Table 7 respectively.

Table 6 Average Price of Rubbers ***(real price data of rubber)***

Level	Dry Rubber Contents (%)	Average Price (Rp)	Average Price equivalent (Rp)
Farmers	37,5	4921,2	13123,2
Wholesalers	54	6435,5	11917,6
Exporters/ Factories	90	15.100	16777,7

Table 7 Average Variable Cost of Rubber Marketing (per kg rubbers)

Cost	Farmers	Wholesalers
Coagulated materials	64.8	0
Labors	80.2	30.5
Transportations	72	27.4
Retributions	0	82.9
Total Cost	217	140.8

In general the average price of rubbers reflects the quality of rubbers. For the analysis, the real price data is used to look at the difference on each level of stakeholders. The highest dry rubber contents obtained the highest prices, while the low dry rubber contents received the lowest price. Price in the level of exporters is the highest among others. It is due to the rubber processing that could increase dry content of rubbers into 90%. In the level of wholesalers, rubbers are kept for 5-6 days before it is brought to the auction market and sold into the exporters or factories. Because of the storage process, dry rubber contents in the level of wholesalers are better than dry rubber contents in the level of farmers.

From the analysis of price, the average equivalent price of rubber in the level of farmers is higher than price equivalent in level of traders. The higher equivalent price of rubber is caused by the traders underestimate the dry rubber content in the level of farmers. With the average dry rubber content given, the price of rubber in the level of farmers could be lower than Rp. 4921,2/ kg.

Concerning to the cost of marketing, average of variable marketing cost in the level of farmers is Rp.217,-/ kg while in the level of wholesalers is Rp 140,8/ kg. The high cost occurs in the farmer's level because they have to spent more money to pay the labor cost and the transportation cost. Related to the transportation cost, farmers are charged by wholesalers for picking up rubbers from plantation to the storage before it is sold to the market. For 100 kg of rubbers farmers have to pay as big as Rp. 15.000- Rp. 20.000,-. The high marketing cost in the level of farmers is not followed by the high price of rubbers, since the farmers unable to set the price. With the average price of rubbers in the level of farmers as big as Rp. 4921,2/ kg, the average marketing cost at the farmer's level is 4,4% of the average price of rubbers.

In the level of traders, the retribution costs become the highest cost among the other costs. Traders have to pay this cost to the government officers related to the use of the road infrastructure. The amount of money that traders have to pay is as big as Rp. 35.000 to Rp. 50.000 from the storage to the auction market. For the transportation cost, traders do not have to pay as big as the farmer's transportation cost. Since the traders charge the transportation cost to farmers, the transportation cost in the level of traders is getting lower. With the average price of rubbers as big as Rp. 6.435,5/ kg, the average marketing cost at the wholesaler's level is 1% of the average price of rubbers. From the percentage of the cost to the price of rubbers in the level of farmers and traders, it indicates that marketing activities are only the small proportion of the price.

Margin Analysis

Marketing margin in the level of farmers is measured by calculating the differentiation between the wholesalers (village traders, sub district traders) selling price and the farmer's selling price. In the level of traders, marketing margin is measured as the differentiation of the wholesaler's selling price and the exporter's selling prices.

In order to demonstrate the price spread at each level of the supply chain, the margin from farmers to traders or wholesalers is labeled as M1. The margin from the wholesalers to the exporters in the auction market is labeled as M2. For the exporters, due to the availability of data, the margin is not measured in the analysis. The output of marketing margin analysis is shown in the Table 8 below.

Table 8 Average Marketing Margin of Rubber

	Traders to Farmers (Rp)	Exporters to Traders (Rp)
Marketing Margin	2993.48	2754.71

From the output result is shown that the average level of marketing margin in the level of farmers to traders is Rp. 2993,5/ kg, while from the level of wholesalers to the exporters is Rp. 2754,7/ kg. The difference of marketing margin between these two levels is due to the selling price of each level. The selling price of rubber is measured based on dry rubber contents and dirty material contents. From the farmers to wholesalers, the average dry rubber contents is 37,5%, meanwhile from the wholesalers to the exporters the dry rubber contents increase to 54%. The high dry rubber content in the level of traders is due to the traders keep the rubbers for 5-7 days before they bring and sell rubbers to exporters in the auction market. This condition is different with farmers. After they tap and print rubbers, they only keep the rubbers for 1-2 days and sell it to the wholesalers.

As price increased across all levels, margins at every stage of marketing are positive, implying that as rubbers moved from farmers to exporters, additional marketing services are made to rubbers to maintain its quality (dry rubber contents) and to make it acceptable to the exporters. Although the margins are positive, the marketing services are not large enough. These are depicted in the marketing costs where the total marketing costs from farm to wholesalers increase and decrease from wholesalers to exporters.

Price Analysis at Farm Gate Level

Following the marketing margin analysis, the responsiveness of the price across level in supply chain is also analyzed. Price transmission analysis is derived by estimating coefficient from selling to buying activity such as buying price, selling price, dry rubber contents, marketing costs, and effect of traders. In this analysis, the effects of traders are considered as the dummy variables.

Farm Gate Price at level wholesalers to farmers

In order to analyze the price transmission from farmers to wholesalers, all variables are included into the model. The general model that is used is:

$$P_B = f\,(P_S, C, D)$$

An econometric model relating prices across the supply chain of rubbers is estimated to get the coefficients of the selling price to buying price. The empirical counterpart of general model becomes:

$$P_S = \beta_0 + \beta_1 \sum_{i=1}^{n} C_i + \beta_2 Area + \beta_3 distance + \beta_4 experience + \beta_4 \sum_{i=1}^{n} D$$

Where Ps is the selling price from the farmer to trader, selling price that is used in the analysis is the equivalent prices of rubber. It is due to the difference of dry rubber content that make the selling price is different for each level in the supply chain. C is the vector cost that includes all the marketing costs. For the marketing cost, it consists of coagulate materials and labor costs. These costs are measured in per kg of rubbers. For experience variables, it measures in year of farmers experience in rubber cultivation. Distance is measured based on the distance from the rubber plantation to the auction market. The result of price analysis is shown Table 9.

Table 9 Price Analysis from Wholesalers to Farmers

Source	SS	df	MS
Model	657147947	8	82143493.4
Residual	405586338	191	2123488.68
Total	1.0627e+09	199	5340373.29

Number of obs =	200
F(8, 191) =	38.68
Prob > F =	0.0000
R-squared =	0.6184
Adj R-squared =	0.6024
Root MSE =	1457.2

price_eq	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
area	-206.6661	98.41273	-2.10	0.037	-400.7814	-12.55069
coag_cost	19.55242	6.148836	3.18	0.002	7.424074	31.68076
labors	-2.880217	3.563187	-0.81	0.420	-9.908468	4.148033
distance	-15.79278	15.98132	-0.99	0.324	-47.31532	15.72976
experience	41.05071	16.89921	2.43	0.016	7.717654	74.38377
dist_1	(dropped)					
dist_2	-1149.612	1378.767	-0.83	0.405	-3869.177	1569.953
dist_3	-4629.568	814.2078	-5.69	0.000	-6235.562	-3023.575
dist_4	-6831.616	3353.363	-2.04	0.043	-13446	-217.2349
_cons	18012.23	4229.031	4.26	0.000	9670.624	26353.83

From the result, it is shown that the production area has negative and significant effect (P_{value}< 0,05) to selling price. It means when the plantation areas increase for 1 ha, the selling price equivalen of rubber will decrease for Rp.206. For coagulated material, the coefficient shows the positive and significant effect (P_{value}< 0,05) to selling price. For the labors, it is shown that there is no significant effect of labor to the selling price equivalent (P_{value} > 0,05). Distance variables has no significant effect to the traders, but the coefficient result is negative, it means if the

distances is increased for 1 unit, the selling price equivalent decreases Rp. 15,79. Experience of the farmers in rubber cultivation has positive and significant effect to the price, the coefficient of experience is 41,05 with $P_{value} < 0,05$. It means, if the experiences of farmers is increased for 1 year, the selling price also increases Rp.41,05.

For the effect of the traders, district is used to characterize the traders and it is considered as dummy variables in analysis. There are 4 districts are included in the analysis, for Bungo district is labeled district 1, Tebo is labeled district 2, Sarolangun is labeled district 3, and Batanghari is labeled district 4. From the result, it is shown that traders in Tebo, Sarolangun, and Batanghari district have negative value, but only traders in Sarolangun and Batanghari have significant effect to the selling price.

Price Transmission from Wholesalers to Exporters

By using the same general model with price transmission in the level of farmers, the price transmission in the level of wholesalers is also analyzed. The variables that are included in the model consist of the buying price from farmers, the selling price to the exporters, marketing costs, quantity, the exporter's effect, and the district's effect. The model empirical model for price analysis becomes:

$$P_S = \beta_0 + \beta_1 Pbest. + \beta_2 \sum_{i=1}^{n} C_i + \beta_3 Quantity + \beta_4 dis\tan ce + \beta_5 \sum_{i=1}^{n} D$$

For the buying price of rubbers, the predicted price is used in order to avoid endogeneity of prices, since it is also used as the selling price variable in the level of farmers. The predicted price is the selling price from farmers to the traders by including all the independent variables to the analysis.

Table 10 Price Analysis from Exporters to Wholesalers

Source	SS	df	MS
Model	35010127.3	9	3890014.14
Residual	30059958.5	30	1001998.62
Total	65070085.8	39	1668463.74

Number of obs =	40
F(9, 30) =	3.88
Prob > F =	0.0024
R-squared =	0.5380
Adj R-squared =	0.3994
Root MSE =	1001

PS_eq	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Pb_est	-.0264258	.0171818	-1.54	0.135	-.0615157	.0086642
quantity	-.1388527	.1914061	-0.73	0.474	-.5297562	.2520507
labor	41.20844	23.7941	1.73	0.094	-7.385596	89.80247
retribution	-40.53616	21.096	-1.92	0.064	-83.61993	2.547619
E1	-369.222	663.0558	-0.56	0.582	-1723.363	984.9186
E2	-492.2581	716.3053	-0.69	0.497	-1955.149	970.6324
E3	647.1161	1194.974	0.54	0.592	-1793.347	3087.579
E4	(dropped)					
E5	-233.9282	784.2332	-0.30	0.768	-1835.546	1367.69
distance	9.59123	2.433333	3.94	0.000	4.621702	14.56076
_cons	11003.98	1394.494	7.89	0.000	8156.046	13851.92

From Table 10, it is shown that buying price has negative effect but not significant to the selling price. For the quantity of rubber, it has negative effect but not significant to the selling price. The selling price is decreased Rp. 0,13/kg, when the quantity of rubber is increased for 1 unit. Labor, retribution, and distance variables have significant effect (with confidence level 90%) to the selling price. For labor and distance variables, an increase in one unit of each variable will increase the selling price around Rp.41 and Rp. 9.

Table 11 Price Analysis from Exporters to Wholesalers (with district effect)

Source	SS	df	MS
Model	58033263.9	7	8290466.28
Residual	7036821.88	32	219900.684
Total	65070085.8	39	1668463.74

Number of obs =	40
F(7, 32) =	37.70
Prob > F =	0.0000
R-squared =	0.8919
Adj R-squared =	0.8682
Root MSE =	468.94

PS_eq	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Pb_est	-.0056351	.0087411	-0.64	0.524	-.0234402	.01217
quantity	.0268998	.0823194	0.33	0.746	-.1407794	.194579
labor	12.80714	10.60028	1.21	0.236	-8.784933	34.39921
retribution	-9.113626	10.02972	-0.91	0.370	-29.5435	11.31625
distr_1	2939.134	235.1437	12.50	0.000	2460.162	3418.106
distr_2	(dropped)					
distr_3	1027.182	232.5755	4.42	0.000	553.4408	1500.923
distr_4	363.1292	249.3226	1.46	0.155	-144.7244	870.9828
_cons	10677.68	650.541	16.41	0.000	9352.574	12002.79

From the result of analysis, it is shown that buying price have negative value and do not have significant effect to the selling price (with confidence level 95%). Quantity of rubber and labor cost have positive value but not significant to explain the selling price of rubber in the level of traders. For the labor costs, traders use the labor for loading and storage activities. If the traders use more labor in those activities, they have to spent more money for paying labor's wages, so the selling price of rubbers is also increased. For the retribution cost, it shows the negative value but still not significant to explain the selling price of rubbers in wholesalers level.

Concerning on the effect of district to the selling price, it is shown that there is positive effect of each district to the selling price. Bungo district that is labeled as distr_1 has the highest contribution to the selling price. If the rubber that comes from Bungo increases 1 unit, the selling price also increases around Rp. 3800,-. The high selling price in Bungo district is caused by the quality and quantity of rubber are better than other districts.

Evaluation of Marketing Margin and Price Analysis

After all the analysis is employed, it appears that there are differences in marketing margin in the level of farmers and level of traders. The difference in marketing margin is caused by the selling prices that are also different between farmers, traders, and exporters. From the analysis, it shows that the marketing margin in farmer's level is higher than trader's level with margin different as big as Rp.238,97 /kg.

Concerning on the price and the revenue of rubbers, it is shown that the average price of rubber in the level of farmers and traders is able to cover the average marketing cost and profitable for farmers and traders. For the farmers, with the average price is given, the benefit that is received from rubber marketing is Rp. 4772,25 /kg. The benefit that is received by the farmers is only the benefit from rubber marketing and not for the total benefit of rubber plantation. For the traders, the benefit that is received from rubber marketing is Rp. 6448,1/ kg. Overall, the prices of rubbers in the level of farmers and traders are still appropriate to give benefit to the farmers and traders.

Related to the price of rubber in the level of farmers, the average price of rubber is higher than the traders. The higher price in farmer's level is caused by the traders that underestimate the price of rubbers base on the dry rubber content given. As the effect, farmers still get better price for their rubber. In the level of traders, when the district variables are included into the model it gives positive and significant effect to the selling price. Bungo district has the highest value to increase the price since it has better quality and high quantity of rubbers.

Chapter IV: Market Integration

Introduction

Market integration is considered as a long process which can impermanent aberrant from each other in the short run and still be coherent with the idea of an integrated market in the long run. An integrated market gives advantages for both consumers and producers. For the producer, information of spatial market integration enables them to arrange resources more efficiently. Producers can also increase product specialization and scale economies of production, thus giving the producer the ability to reduce the marketing costs especially in information and transportation cost. For consumers, market integration gives access to new varieties of product and off-season of products with potentially lower price. In the other side, the market that is not integrated may convey inaccurate price information that might twist production decision and contribute to inefficiencies of product movement in markets (Susanto, Rosson et al. 2007; Abey P. Philip 2008).

In economic theory, according to Gujarati in Obi and van Schalkwijk (2006) pointed out that the prices normally follow a random walk in the sense that they are subject to periodic swings of stochastic or random nature. In the short term, the agricultural product prices and the range of market will tend to drift apart. This natural non-stationary of the variables creates the justification for the use of error correction and co-integration models.

The analysis of market integration is different with the spatial equilibrium competitive market analysis. Market integration is used to define tradability and contestability between markets. It also implies to the physical flow of commodity, the transmission of price shock from one market to another market, or both (Barrett and Li 2002). The distinction between market integration and spatial equilibrium market analysis is relied on three variables that are prices, transaction costs, and trade volume. Based on those variables, there are four types of market could be distinguished:

a. Perfect integration: the marginal return equals to zero and there is trade occurs between two markets.
b. Segmented equilibrium: the marginal return less than zero and there is no trade occurs between two markets.
c. Imperfect integration: the marginal return not equal to zero and there is equilibrium condition binds with equality when trade occurs.
d. Segmented disequilibrium: the marginal return is bigger than zero, but there is no trade occurs between two markets.

Concerning to this study, the market integration analysis is used to analyze the integration between local rubber market in Jambi Province and the world rubber market by looking at the flow of commodity and influence of the price in the world rubber market to the local market.

Related Study and Previous Research in Market Integration

There are many previous studies that analyze and investigate market integration. Empirical studies on market integration particularly for agricultural products typically use bilateral price relationship as an indicator of market relationship (Baulch 1997; Barrett and Li 2002; Susanto, Rosson et al. 2007; Abey P. Philip 2008).

According to Barret and Li (2002), there is weakness of much of the existing literature that discussed and analyzed about market integration. It attempted inference off only a subset of relevant variables such as prices, and then focused only to the perfect integration, when two markets are both integrated and in competitive equilibrium. Furthermore, their research also introduced a new spatial price analysis methodology based on maximum likelihood estimation which permits differentiation between market integration and competitive market equilibrium.

In the analysis of spatial market and market integration, it has been common to use the co-integration techniques by testing the Law of One Prices (LOP) and examining the degree of integration between markets in different regions (Baulch 1997; McNew and Fackler 1997; Susanto, Rosson et al. 2007).

Goodwin (1990) and McNew and Fackler (1997) argued that the concept of efficiency and LOP are synonymous and take means the arbitrage opportunities could be eliminated. In their study, they tried to distinguish between the concept of efficiency and market integration. By using the transport rates and cost of arbitrages as the variables in the integration analysis, they concluded that the relationship between integration and arbitrage condition was not consistent. They also pointed out that if the price that would be occurred in the absence of trade (autarky) is not co integrated, and then the trading patterns among regions are likely to shift overtime.

Concerning to agricultural product market, a number of studies and research had been done in order to analyze co integration between markets. Zanias (1999) analyzed the seasonality and spatial market integration of agricultural product. In his analysis, he introduced the seasonal characteristics of agricultural product prices into the LOP tests which are based on co integration analysis. It was also concluded that the seasonality condition of agricultural product did affect integration and co integration, and thus the LOP testing results.

Baulch (1997) tested food integration market by considering the statistical performance of four commonly used for market integration which are The Law of One Price, The Ravallion model (1986), Co integration model, and Granger causality test. It also provided a review of the debate and looked at the statistical performance of market integration.

Thilmany et al(2003) applied spatial equilibrium mixed distribution method to examine the vine ripe tomato market relationship in Mexico and United States markets. In the analysis, it determined differential market condition that were markedly different in several respects, included distance from competing production regions and consumer market size.

Mustaq and Khalid cited in (Abey P. Philip 2008) discussed the implication of market integration in Pakistan where the market integration reduced the cost of stabilization. It also stated that the price integration is conducted to identify sets of markets that lead other markets such as agricultural market in the price transmission process.

A.P. Philip (2008) analyzed market integration hypothesis for rubber cultivation of Kerala. The Augmented Dickey-Fuller and Error Correction Model are used as the statistical tools for analyzing market co integration and causal nexus between two rubber market prices. This paper also argued that time series analysis can helpful to provide insight into the market integration and price transmission if an appropriate testing framework is employed and the results are interpreted correctly.

Methodology

In order to determine the nature of each bivariate relationship of the movement of the causality in this study will be used Granger tests. The first test uses the Ordinary Least Square (OLS) regression. The regression analysis provides a method of estimating relationship among variables. Multiple linear regression equation considers the net relationship between each explanatory variables and dependent variables (V_0), the model of multiple linear regressions is specified by:

$$V_0 = \beta_0 + \beta_1 V_{t1} + \beta_2 V_{t2} + \ldots + \beta_K V_{tK} + e_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (4)$$

Where V_0 is the observable dependent variable in the market, V_{tk} are the observable independent variables, e_t is the unobservable error of disturbance term, β_k are the unknown population parameters to be estimated, and t is the number of observation on the variables.

Time series analysis can provide useful insight into the question of market integration and price transmission if an appropriate testing framework is employed and the results of analysis are interpreted correctly. Co integration and Error Correction Model provide an analytical tool that can focus on the case of price transmission or market integration (Abey P. Philip 2008).

To analyze the validity of market integration, the co integration technique will be used with special references to prices of rubber in Jambi Province. As the first step before doing co integration analysis, Dickey-Fuller test is employed to determine since co integration between two variables appears only when there are of same categorize. This test is generally used which entails the estimation of the following equation:

$$DX_t = a_0 + b_1 X_{t-1} + b_2 T + e_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (5)$$

Where D= change, T= trend. The null hypothesis that X_t is I (O) is rejected in favor of the alternative hypothesis that X_t is I (1), provided b is negative and statistically significant. For

testing purpose, statistical analysis by using t-test through under the null hypothesis it does not follow the t-distribution.

After co integration is ascertained, there is one or several stationary linear combination of non stationary time series. Within this condition, estimator variables may flow apart in the short run, but in the long run many factors will bring them together again. The common t and F test cannot be applied into these estimator variables because asymptotically there exists no normal distribution for them. Therefore we should investigate these by following (Engle 1987) and estimate co-integrating regression of the form

$$\ln(MP_t) = \gamma_0 + \gamma_1 \ln(NP_t) + u_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (6)$$

MP_t and NP_t represent the prices in the two rubber markets which are the price of Jambi Rubber market and the price of Malaysia rubber market.

After confirming co integration between variables of market integration, one should search for proper error correction model. Based on the definition of co integration Engle (1987) states if two variables are co integrated, there exists a valid error correction representation of the data. Therefore the following adjustment of error correction regression can be estimated.

$$DX_t = a_0 + p_1 E_{t-1} + lag(DX_t, DY_t) = U_{1t} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (8)$$

Where D= change, E_{t-1}= the lagged error obtained from co integration regression equation, U_{1t} = U_{2t} = finite order moving averages, and $P_1P_2 = 0$. The error correction models clarify two source of causation either through lag Y_t or through E_{t-1}.

Result and Discussion

Time series data of rubber price is used to determine co integration between auction market in Jambi and Malaysia rubber market. Data for Malaysia Rubber Price is obtained from Before any test of co integration, it is necessary in the first place to ascertain since co integration between two variables arises only when there are of same order. Therefore, the test for unit root becomes obvious. The Dickey Fuller test is used which requires the estimation of the following regression:

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \alpha_i \Sigma \Delta Y_{t-1} + \varepsilon_t$$

Where ε_t is a pure white noise error term and where $\Delta Y_{t-1} = (Y_{t-1} - Y_{t-2})$. The number of lagged difference terms to include is often determined empirically. The statistical hypothesis for the following regression is:

$H_0 : \delta = 0$

$H_1 : \delta < 0$

Table 12 Augmented Dickey Fuller Test (ADF)

Variables	ADF test (Constant included)	Lag	ADF test (constant and trend included)	Lag
Level				
Auction Price	-2.554619	0	-2.718999	0
Malaysia Price	-2.188346	3	-2.070483	3
First Difference				
Auction Price	-8.547762	0	-6.763095	1
Malaysia Price	-2.492782	2	-2.667326	2

Significance level :	1%	5%	10%
Constant	-3.525618	-2.902953	-2.588902
Constant and Trend	-4.092547	-3.474363	-3.164499

All variables indicate the I(1), and it indicates the variables are stationary both in Jambi and Malaysia rubber prices. After unit root test is done and all variables indicates the I(1), the next step is to test co integration between two variables utilizing Johansen Co integration test. Before test is done, the number of lag is chosen using the Akaike Information Criterion (AIC). The number of lag chosen is 8. The result of the Johansen Co integration test is shown in Table 13.

Table 13 Johansen Co integration Test

Date: 08/30/09 Time: 16:00
Sample(adjusted): 10 72
Included observations: 63 after adjusting endpoints
Trend assumption: Linear deterministic trend
Series: MALAYSIA AUCTION
Lags interval (in first differences): 1 to 8

Unrestricted Cointegration Rank Test

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	5 Percent Critical Value	1 Percent Critical Value
None *	0.185594	17.62975	15.41	20.04
At most 1 *	0.071831	4.696078	3.76	6.65

*(**) denotes rejection of the hypothesis at the 5%(1%) level
Trace test indicates 2 cointegrating equation(s) at the 5% level
Trace test indicates no cointegration at the 1% level

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	5 Percent Critical Value	1 Percent Critical Value
None	0.185594	12.93368	14.07	18.63
At most 1 *	0.071831	4.696078	3.76	6.65

*(**) denotes rejection of the hypothesis at the 5%(1%) level
Max-eigenvalue test indicates no cointegration at both 5% and 1% levels

Error Correction Models

Cointegrating Eq:	CointEq1
MALAYSIA(-1)	1.000000
AUCTION(-1)	18.69633
	(5.62343)
	[3.32472]
C	-181197.8

Error Correction:	D(MALAYSIA)	D(AUCTION)
CointEq1	-0.039594	-0.019632
	(0.03279)	(0.00618)
	[-1.20746]	[-3.17439]
D(MALAYSIA(-1))	0.412950	0.042246
	(0.15340)	(0.02893)
	[2.69201]	[1.46023]
D(MALAYSIA(-2))	-0.266144	-0.047912
	(0.16502)	(0.03112)
	[-1.61279]	[-1.53943]
D(MALAYSIA(-3))	0.589287	0.065260
	(0.17349)	(0.03272)

	[3.39659]	[1.99445]
D(MALAYSIA(-4))	-0.080083	-0.010109
	(0.20199)	(0.03810)
	[-0.39647]	[-0.26535]
D(MALAYSIA(-5))	0.171664	0.094786
	(0.21622)	(0.04078)
	[0.79393]	[2.32434]
D(MALAYSIA(-6))	-0.069312	-0.105084
	(0.22492)	(0.04242)
	[-0.30816]	[-2.47719]
D(MALAYSIA(-7))	0.072639	0.033207
	(0.22784)	(0.04297)
	[0.31882]	[0.77277]
D(MALAYSIA(-8))	-0.146218	-0.008131
	(0.20924)	(0.03946)
	[-0.69880]	[-0.20604]
D(AUCTION(-1))	-0.754453	0.195508
	(0.77686)	(0.14652)
	[-0.97116]	[1.33438]
D(AUCTION(-2))	-0.578182	0.150901
	(0.78751)	(0.14852)
	[-0.73419]	[1.01600]
D(AUCTION(-3))	0.853333	0.153293
	(0.78210)	(0.14750)
	[1.09107]	[1.03924]
D(AUCTION(-4))	0.089233	0.063573
	(0.72587)	(0.13690)
	[0.12293]	[0.46437]
D(AUCTION(-5))	-0.325725	0.270487
	(0.72211)	(0.13619)
	[-0.45107]	[1.98610]
D(AUCTION(-6))	0.924974	0.377233
	(0.72502)	(0.13674)
	[1.27579]	[2.75877]
D(AUCTION(-7))	1.051238	0.029121
	(0.76441)	(0.14417)
	[1.37523]	[0.20199]
D(AUCTION(-8))	0.888254	-0.098744
	(0.75020)	(0.14149)
	[1.18401]	[-0.69790]

From the result of Johansen test for co integration, there is evidence that the rubber price in Jambi Auction Market and the rubber price in Malaysia are co-integrated with the Johansen test rejecting the null hypothesis. Co-integration suggests that rubber price are integrated to the market process and there is Granger Causality at least one direction. However, lagged difference terms are also expected to be negative, reflecting somewhat complex short run dynamics. From the result it is found negative values of lagged difference term in Malaysia and auction market in Jambi Province that indicate the short run dynamic to both markets.

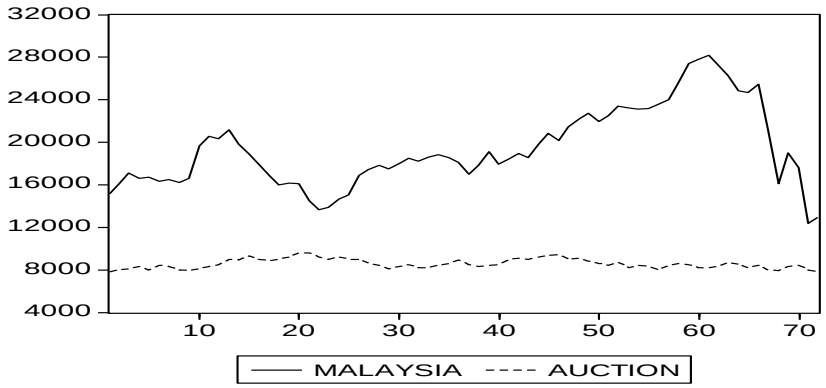
From the error correction model analysis, it is shown that the change in auction price is influenced and co integrated with the lag variables of Malaysia rubber prices and lag variables of Auction market itself. After co integration is ascertained, the Granger test is employed to analyze the causality of the prices in Jambi rubber market. The result of Granger test is shown in Table 14 below.

Table 14 Granger Causality test.

Null Hypothesis:	Obs	F-Statistic	Probability
PRICES does not Granger Cause WORLD	64	0.91879	0.50964
WORLD does not Granger Cause PRICES		2.27861	0.03771

From the Granger test, it indicates that there is Granger causality in at least one direction. It is shown that the null hypothesis is rejected for the Malaysia price does not cause the price in Jambi auction market. Overall, there is sufficient evidence to conclude that Jambi rubber market is integrated with the Malaysia market in the long run.

Figure 2 Graphic of Malaysia Rubber Prices and Jambi Auction Prices



Chapter V: Conclusion

Objective (1)

All the stakeholders in rubber market have different roles and activities. There are 4 (four) stakeholders that involve in Jambi rubber market that consist of farmers, wholesalers, exporters, and government. For the farmers, wholesalers, and exporters, they involve directly in supply chain of rubbers. While for the government only involves in controlling and making policies related to the smallholder plantation development.

As a main producer of natural rubbers, farmers have done many activities either activities that are related to rubber cultivation or activities in rubber market. Concerning on the price decision, farmers only have little or no bargaining position in the market since the price of rubbers is decided by the traders. This condition makes the farmers always become price taker in rubber market.

Rubber market in Jambi Province is characterized as monopolistic competition. It is shown by the existence of many traders in rubber market. Unlike perfect competition, the sellers under monopolistic competition differentiate competitive product. In rubber market, the differentiation of product is based on the dry rubber contents. For the farmer's level, rubber is sold by average dry rubber contents of 37.5%. While for the traders and exporters, average of dry rubber content is increasing up to 54% and 90%.

Overall, the difference of dry rubber content influences the selling price. The higher dry rubber content, the better price will be achieved by the seller. In order to get the high dry rubber content, it needs more time for storage and processing.

Objective (2)

Marketing margin analysis in rubber cultivation is measured based on the supply chain in rubber market. From the supply chain in rubber market, there are two levels in the supply chain that are from the farmers to the traders or wholesalers, and from the wholesalers to the exporters. Marketing margin in the first level is smaller than the second level, and the high margin in second level is due to the selling prices that are higher than buying price in the exporter's level.

As price increased across all levels in supply chain, margins at every stage of marketing are positive, implying that as rubbers moved from farmers to exporters, additional marketing services are made to rubbers to maintain its quality (dry rubber contents) and to make it acceptable to the exporters. Although the margins are positive, the marketing services are not large enough. These are depicted in the marketing costs where the total marketing costs from farm to wholesalers increase and decrease from wholesalers to exporters.

For the farm gate analysis, it is derived by estimating coefficient from selling to buying activity such as buying price, selling price, marketing costs, effect of traders, and effect of region. In the level of farmer, without considering the effect of traders, the marketing costs have influenced price of rubber especially for the transportation and labor cost. When the effect of traders is included into the model, the influence of marketing cost in the price becomes not significant. The significant effect of the traders shows that traders have important roles for deciding the selling price in the level of farmers.

In terms of the price and the revenue of rubbers, the average price of rubber in the level of farmers and traders is able to cover the average marketing cost and profitable for farmers and traders. Briefly, the prices of rubbers in the level of farmers and traders are still appropriate to give benefit to the farmers and traders.

Objective (3)

The integration of rubber market is measured by using the time series data from 2006-2008. By taking the data on rubber prices in the Jambi auction market, and Malaysia rubber market as the world price. The current price and lagged price in both markets are considered as variables that explain the market integration.

Based on the co-integration analysis, it indicates that variables are stationary and co-integrated both in Jambi and Malaysia rubber prices. After co integration of two markets is obtained, the Granger test is employed to analyze the causality of the prices in Jambi rubber market. From this test, it indicates that there is causality in at least one direction that the Malaysia price causes the price in Jambi auction market. In brief, there is sufficient evidence to conclude that Jambi rubber market is integrated with the Malaysia market in the long run.

Recommendation

Objective 1

In the role and activities of stakeholders in rubber market, the involvement and function of government are expected not only as policy maker in rubber market system. The government is also expected to be more active in rubber market system, especially for supporting the farmers in order to get the information related to the price of rubbers and the measurement of dry rubber content. From the discussion in previous chapters, it is shown that the farmers have less or no bargaining position in rubber market due to the limitation of information about price and also dry content of rubbers. The government is also expected to provide the tools for measuring dry rubber content in the auction market. Therefore, the farmers and traders can get better price for their rubber based on dry rubber content correctly.

Concerning on the role of the institution in rubber market, it is found that the roles of institutions still not enough, particularly for farmer institutions. There are many institutions that involve in

rubber market such as farmer groups and village cooperation unit. For the farmers group, it is very useful for the farmers to become member of farmers group. Farmers can discuss each other about their problem and get the information about price and technology. Related to the village cooperation unit, the existence of this institution is decreasing because farmers do not believe the committee and management in this institution. It is expected to be more transparent to the members in the future, so it could be more profitable to all of its members.

Objective 2

Concerning on the margin and price analysis in rubber market, it is found that there is different margin between levels of stakeholders in the market. The difference in margin is not only caused by the selling price, but also the transaction cost that have to spent by farmers and traders in rubber market. Especially for the farmers, they have to spent more money for marketing cost.

The selling price of rubbers is decided base on dry rubber content. Rubber with high dry rubber content will get better price from buyers. In the farmer's level, the dry rubber content is lower than the trader's level. For getting the high dry rubber contents, farmers should not sell the rubbers to the traders quickly. They have to keep their rubbers in storage for increasing dry rubber contents.

Objective 3

From the analysis it is shown that there is small co-integration between Jambi rubber market and Malaysia rubber market related to the price of rubbers. It is shown that the price in Malaysia causes the price in Jambi auction market. Therefore, farmers as rubber producers and government must be aware when the price of rubber in Malaysia beginning to rise.

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Appendix

Table 1: Data of Farmer's Respondent in Jambi Province

No	Family members	Education level	Experience	Land Clearing	Rubber Seed	Distance to market
1	5	No school	20	SB	local	250
2	6	Junior HS	4	SB	local	250
3	6	Primary school	12	SB	local	250
4	7	Primary school	10	SB	local	250
5	5	No school	5	SB	local	250
6	4	No school	5	SB	local	250
7	7	No school	10	SB	local	250
8	5	Junior HS	8	SB	local	250
9	6	No school	20	SB	local	250
10	5	Senior HS	15	SB	local	250
11	4	No school	10	SB	gov	250
12	4	Academy	10	SB	gov	250
13	4	No school	15	SB	gov	250
14	6	No school	20	SB	gov	250
15	7	Junior HS	20	SB	gov	250
16	6	Primary school	10	SB	local	250
17	5	Primary school	6	SB	local	250
18	3	Senior HS	5	SB	local	250
19	8	No school	15	SB	local	250
20	3	Senior HS	15	SB	gov	250
21	5	Primary school	20	SB	gov	250
22	4	No school	7	SB	gov	250
23	4	Senior HS	10	SB	gov	250
24	4	No school	10	SB	gov	250
25	6	No school	15	SB	local	270
26	3	No school	23	SB	local	270
27	3	Primary school	15	SB	local	270
28	3	Primary school	13	SB	local	270
29	4	Primary school	16	SB	local	270
30	5	Primary school	15	SB	local	270
31	6	Primary school	20	SB	local	270
32	10	Junior HS	10	SB	local	270
33	5	No school	20	SB	local	270
34	4	No school	25	SB	local	270
35	2	No school	25	SB	local	270
36	4	Primary school	30	SB	local	270
37	4	Primary school	23	SB	local	270
38	4	Primary school	15	SB	local	270
39	6	Junior HS	18	SB	local	270

40	6	Primary school	8	SB	local	270
41	3	Primary school	10	SB	local	270
42	3	Primary school	21	SB	local	270
43	5	Junior HS	20	SB	local	270
44	3	Senior HS	12	SB	local	270
45	8	Primary school	24	SB	local	270
46	2	Senior HS	30	SB	local	270
47	5	Primary school	24	SB	gov	270
48	4	Primary school	15	SB	gov	270
49	4	Academy	25	SB	gov	270
50	6	Senior HS	25	SB	gov	270
51	4	Primary school	10	NO	gov	180
52	2	Primary school	22	SB	gov	180
53	4	Junior HS	22	SB	local	180
54	6	Senior HS	23	SB	local	180
55	4	Junior HS	19	SB	local	180
56	6	Junior HS	6	SB	local	180
57	4	Academy	15	SB	local	180
58	7	Primary school	27	SB	local	180
59	7	Primary school	19	SB	local	180
60	4	Primary school	4	SB	local	180
61	4	Senior HS	8	SB	local	180
62	3	Senior HS	20	NO	gov	180
63	3	Junior HS	27	SB	gov	180
64	3	Senior HS	8	SB	local	180
65	2	Primary school	29	SB	local	180
66	3	Senior HS	12	NO	local	180
67	3	Primary school	4	SB	local	180
68	4	Junior HS	20	SB	local	180
69	4	Senior HS	16	SB	local	180
70	4	Primary school	10	SB	local	180
71	3	Junior HS	22	NO	local	180
72	5	Senior HS	13	SB	local	180
73	3	Primary school	20	SB	local	180
74	4	Senior HS	15	SB	local	180
75	3	No school	10	SB	local	180
76	8	Junior HS	15	SB	local	180
77	8	Primary school	20	NO	local	180
78	5	Primary school	15	NO	gov	180
79	4	No school	16	SB	gov	180
80	4	No school	15	SB	gov	180
81	3	No school	25	SB	gov	180
82	6	Junior HS	13	NO	local	180
83	5	Junior HS	10	SB	local	180
84	5	Senior HS	15	SB	local	180
85	6	Senior HS	20	SB	local	180
86	7	Academy	25	SB	local	180

87	8	No school	14	NO	local	180
88	3	No school	24	NO	local	180
89	3	Junior HS	20	SB	local	180
90	7	Primary school	12	SB	local	180
91	5	Primary school	15	SB	local	180
92	2	Senior HS	32	SB	local	180
93	5	No school	25	SB	local	180
94	3	Senior HS	16	SB	local	180
95	4	Primary school	22	SB	local	180
96	5	No school	10	SB	local	180
97	3	Senior HS	22	SB	gov	180
98	6	No school	15	SB	gov	180
99	4	No school	20	SB	gov	180
100	3	Primary school	15	SB	gov	180
101	4	Senior HS	10	SB	gov	206
102	4	Academy	10	SB	gov	206
103	8	Senior HS	10	SB	gov	206
104	4	Senior HS	10	SB	local	206
105	5	Senior HS	10	SB	local	206
106	5	Junior HS	10	SB	local	206
107	4	Junior HS	10	SB	local	206
108	6	Junior HS	10	SB	local	206
109	5	Junior HS	10	SB	local	206
110	7	Primary school	10	SB	local	206
111	4	Senior HS	10	SB	local	206
112	4	Primary school	10	SB	local	206
113	6	Junior HS	10	SB	local	206
114	5	Senior HS	10	SB	local	206
115	7	Primary school	8	NO	local	206
116	4	Senior HS	10	NO	local	206
117	4	Primary school	10	SB	local	206
118	4	Primary school	10	SB	local	206
119	5	Senior HS	10	SB	local	206
120	6	Primary school	10	SB	local	206
121	5	Primary school	10	SB	local	206
122	5	Junior HS	10	SB	gov	206
123	5	Senior HS	10	SB	gov	206
124	4	Senior HS	10	SB	gov	206
125	5	Senior HS	10	SB	gov	206
126	2	Junior HS	31	NO	gov	220
127	4	Primary school	20	SB	local	220
128	4	Primary school	20	SB	local	220
129	4	Senior HS	20	SB	gov	220
130	4	Primary school	25	SB	gov	220
131	3	Junior HS	10	SB	local	220
132	5	Junior HS	20	SB	local	220
133	7	Senior HS	20	SB	local	220

134	5	Junior HS	30	SB	local	220
135	5	Primary school	15	SB	local	220
136	3	Primary school	29	SB	local	220
137	5	Senior HS	9	SB	local	220
138	4	Primary school	29	SB	local	220
139	10	Primary school	9	SB	gov	220
140	4	Primary school	5	SB	gov	220
141	2	Junior HS	24	SB	gov	220
142	3	Junior HS	15	SB	local	220
143	6	Primary school	30	NO	local	220
144	5	Primary school	20	NO	local	220
145	7	Primary school	20	NO	local	220
146	5	Senior HS	10	SB	local	220
147	3	Primary school	10	SB	local	220
148	3	Primary school	13	SB	gov	220
149	6	Senior HS	8	SB	gov	220
150	5	Junior HS	21	SB	gov	220
151	4	Junior HS	15	SB	gov	60
152	3	Junior HS	20	SB	gov	60
153	4	Junior HS	10	SB	gov	60
154	5	Primary school	15	SB	gov	60
155	3	Primary school	15	SB	gov	60
156	3	Senior HS	20	SB	gov	60
157	5	Junior HS	20	SB	gov	60
158	6	Academy	10	SB	gov	60
159	4	Senior HS	15	SB	gov	60
160	5	Senior HS	15	SB	gov	60
161	3	Primary school	30	SB	gov	60
162	5	Primary school	30	SB	gov	60
163	4	Primary school	25	SB	local	60
164	4	Junior HS	15	SB	local	60
165	5	Junior HS	15	SB	local	60
166	4	Senior HS	10	SB	local	60
167	6	Junior HS	20	SB	local	60
168	4	Junior HS	25	SB	local	60
169	5	Academy	10	NO	local	60
170	3	Senior HS	15	NO	local	60
171	5	Primary school	30	SB	local	60
172	3	Primary school	30	SB	local	60
173	3	Primary school	25	SB	local	60
174	4	Primary school	25	NO	local	60
175	5	Senior HS	10	NO	local	60
176	5	Primary school	20	NO	local	45
177	6	Primary school	20	SB	local	45
178	4	Senior HS	10	SB	local	45
179	4	Junior HS	15	SB	local	45
180	6	Junior HS	15	SB	local	45

181	7	Academy	10	SB	local	45
182	4	Junior HS	25	SB	gov	45
183	6	Junior HS	20	SB	gov	45
184	7	Junior HS	20	SB	gov	45
185	7	Junior HS	15	SB	gov	45
186	6	Senior HS	15	SB	gov	45
187	4	Senior HS	20	SB	gov	45
188	5	Primary school	20	SB	gov	45
189	4	Primary school	25	SB	gov	45
190	4	Primary school	25	SB	gov	45
191	4	Senior HS	10	SB	local	45
192	5	Junior HS	10	SB	local	45
193	6	Junior HS	10	SB	local	45
194	6	Senior HS	15	SB	local	45
195	6	Senior HS	20	SB	local	45
196	5	Senior HS	25	SB	local	45
197	5	Junior HS	15	SB	local	45
198	5	Junior HS	30	SB	local	45
199	5	Junior HS	30	SB	local	45
200	5	Junior HS	25	SB	local	45

SB: Slash and Burn

Gov: Government seeds

Table 2. Marketing Cost in Farmer's Level

No	Area (Ha)	Production (kg)	Dry Rubber Contents (%)	Cost (Rp)			Total Cost (Rp)	Price (Rp/kg)
				Coagulated	Labor	Transportation		
1	3	720	45	45000	72000	40000	157000	5200
2	2	500	40	30000	60000	30000	120000	6500
3	3	600	45	45000	72000	35000	152000	6500
4	3	600	45	45000	72000	35000	152000	5700
5	3	900	40	45000	72000	50000	167000	6300
6	4	960	40	60000	100000	50000	210000	6000
7	2	500	35	30000	60000	25000	115000	6500
8	2	500	35	30000	60000	25000	115000	6200
9	3	720	45	45000	72000	35000	152000	6000
10	4	800	40	60000	100000	45000	205000	6200
11	2	500	40	30000	60000	30000	120000	6500
12	2	500	40	30000	60000	30000	120000	5200
13	4	800	45	60000	100000	45000	205000	5500
14	3	600	40	45000	75000	35000	155000	6300
15	1	250	40	15000	25000	20000	60000	6200
16	3	600	45	45000	75000	35000	155000	6500
17	2	550	40	30000	60000	30000	120000	6000
18	3	640	40	45000	75000	40000	160000	6200
19	2	500	40	30000	50000	30000	110000	6100
20	2	500	40	30000	50000	30000	110000	6500
21	4	800	40	60000	80000	45000	185000	6300
22	3	600	40	45000	60000	35000	140000	5800
23	4	800	40	60000	80000	45000	185000	6000
24	4	800	40	60000	80000	45000	185000	6200
25	3	700	40	45000	75000	40000	160000	6500
26	4	850	40	60000	80000	50000	190000	5500
27	1	240	40	15000	25000	20000	60000	5700
28	4	600	45	60000	60000	35000	155000	5700
29	4	750	45	60000	60000	40000	160000	6000
30	4	720	45	60000	60000	40000	160000	6200

31	2	500	40	30000	50000	30000	110000	6000
32	4	900	40	60000	75000	50000	185000	5500
33	4	900	40	60000	60000	50000	170000	5200
34	2	450	35	30000	40000	30000	100000	5400
35	1	200	35	15000	20000	15000	50000	6200
36	2	400	35	30000	40000	25000	95000	6300
37	2	400	35	30000	40000	25000	95000	6200
38	2	450	40	30000	40000	30000	100000	5500
39	2	450	40	30000	40000	30000	100000	5400
40	1	200	35	15000	20000	15000	50000	6000
41	1	200	35	15000	20000	15000	50000	6200
42	1	200	35	15000	20000	15000	50000	6500
43	1	200	35	15000	20000	15000	50000	5700
44	3	750	45	45000	60000	40000	145000	6000
45	2	400	40	30000	45000	25000	100000	5500
46	2	450	40	30000	30000	25000	85000	6300
47	4	800	45	60000	60000	45000	165000	6500
48	1	200	40	15000	20000	15000	50000	6200
49	1	240	40	15000	20000	20000	55000	6000
50	1	200	40	15000	20000	15000	50000	5500
51	4	1000	30	32000	75000	75000	182000	4000
52	2	800	30	16000	30000	45000	91000	4000
53	3	600	30	24000	30000	35000	89000	4000
54	2	400	30	16000	25000	25000	66000	4000
55	2	320	30	16000	40000	25000	81000	4000
56	2	420	30	16000	40000	25000	81000	4000
57	2	400	30	16000	40000	25000	81000	4000
58	2	600	30	16000	25000	35000	76000	5000
59	4	880	30	32000	60000	65000	157000	4000
60	2	400	30	16000	30000	25000	71000	4000
61	2	600	30	16000	30000	35000	81000	4000
62	1	300	30	8000	20000	25000	53000	4500
63	2	480	30	16000	25000	45000	86000	4000
64	1	280	30	8000	20000	15000	43000	4200

65	3	320	30	24000	60000	25000	109000	4500
66	3	400	30	24000	40000	25000	89000	4000
67	1	200	30	8000	20000	15000	43000	4000
68	1	280	30	8000	20000	15000	43000	4000
69	1	200	30	8000	20000	15000	43000	3800
70	3	280	30	24000	40000	15000	79000	4000
71	2	400	30	16000	25000	25000	66000	4000
72	0.5	120	35	8000	0	15000	23000	4000
73	1	240	30	8000	0	15000	23000	4000
74	3	600	30	24000	40000	35000	99000	3800
75	1	180	30	8000	20000	15000	43000	4200
76	1.5	280	30	16000	25000	15000	56000	4800
77	1.4	140	30	16000	20000	15000	51000	4800
78	2	600	30	16000	40000	35000	91000	4800
79	2	400	30	16000	30000	25000	71000	4800
80	2	600	30	16000	30000	35000	81000	4800
81	1.5	400	30	16000	30000	25000	71000	5000
82	2	200	30	16000	25000	15000	56000	5000
83	1	240	30	8000	0	15000	23000	4800
84	1.4	300	30	16000	20000	25000	61000	5000
85	1	250	30	8000	20000	15000	43000	5000
86	1	200	30	8000	0	15000	23000	4800
87	4	800	30	32000	50000	60000	142000	5000
88	6	1000	30	48000	60000	75000	183000	5000
89	1	250	30	8000	0	15000	23000	4800
90	4	800	30	32000	60000	60000	152000	5000
91	2	440	30	16000	30000	25000	71000	5000
92	1	120	30	8000	0	15000	23000	5000
93	1.5	280	30	16000	20000	15000	51000	4800
94	5	900	30	40000	45000	75000	160000	4800
95	1	200	30	8000	0	15000	23000	5000
96	1	240	30	8000	0	15000	23000	5000
97	2	450	30	16000	30000	25000	71000	5000
98	3	600	30	24000	40000	35000	99000	5000

99	4	1000	30	32000	60000	75000	167000	4800
100	2	600	30	16000	30000	35000	81000	4800
101	2	400	45	24000	40000	30000	94000	5000
102	2.5	500	45	36000	50000	30000	116000	4000
103	2	400	45	24000	40000	30000	94000	4500
104	1.5	240	40	24000	0	20000	44000	4800
105	1	160	40	12000	0	20000	32000	4200
106	2	400	40	24000	25000	30000	79000	4000
107	2	400	40	24000	25000	30000	79000	4200
108	2.5	500	40	36000	30000	30000	96000	3500
109	4	800	45	48000	60000	60000	168000	4500
110	2	400	40	24000	30000	30000	84000	4000
111	2	220	40	24000	30000	20000	74000	4000
112	4	700	40	48000	60000	60000	168000	4000
113	2	400	35	24000	25000	30000	79000	4000
114	4	560	40	48000	60000	35000	143000	4000
115	2	340	40	24000	40000	25000	89000	5000
116	2	420	40	24000	25000	30000	79000	4500
117	2.5	480	45	30000	40000	30000	100000	4000
118	2	400	40	24000	30000	30000	84000	4000
119	1.5	200	40	18000	25000	20000	63000	4000
120	2	460	40	24000	40000	30000	94000	4000
121	2	400	40	24000	40000	30000	94000	5000
122	2	520	40	24000	40000	35000	99000	4300
123	3.5	540	45	42000	60000	35000	137000	4200
124	2	400	45	24000	40000	30000	94000	4200
125	2	400	40	24000	40000	30000	94000	4000
126	3	600	35	45000	60000	35000	140000	5300
127	4	800	35	60000	75000	65000	200000	4500
128	5	1000	40	75000	75000	80000	230000	4500
129	4.5	900	40	75000	60000	75000	210000	4000
130	7	1200	45	84000	100000	100000	284000	4000
131	2.5	1000	35	30000	30000	80000	140000	4500
132	3	400	35	36000	45000	30000	111000	4000

133	2.5	480	35	30000	40000	30000	100000	4200
134	2	400	35	24000	25000	30000	79000	4000
135	3	600	40	36000	60000	45000	141000	5000
136	3	600	40	36000	45000	35000	116000	4800
137	4	800	40	48000	75000	65000	188000	4800
138	1.5	200	35	30000	20000	20000	70000	5300
139	1	200	35	15000	0	20000	35000	4500
140	3	750	40	45000	45000	60000	150000	4000
141	3.5	800	40	42000	40000	65000	147000	5000
142	2.5	400	40	30000	40000	30000	100000	4500
143	3	700	40	36000	50000	60000	146000	4500
144	1	240	35	12000	0	20000	32000	5000
145	5	900	45	60000	60000	75000	195000	4500
146	4	800	40	48000	60000	65000	173000	4800
147	2	360	40	24000	30000	25000	79000	5300
148	2	400	40	24000	40000	30000	94000	4500
149	3	600	40	45000	60000	45000	150000	5000
150	4	800	45	60000	75000	60000	195000	5000
151	2.5	450	40	30000	30000	30000	90000	4500
152	3	600	40	36000	36000	35000	107000	4500
153	2.5	400	40	30000	25000	30000	85000	4500
154	2	450	40	24000	30000	30000	84000	4500
155	3.5	700	40	42000	45000	50000	137000	4500
156	3	700	40	36000	40000	50000	126000	4000
157	2	500	40	24000	30000	30000	84000	4500
158	3	900	40	36000	45000	75000	156000	4500
159	1	200	40	12000	0	20000	32000	4000
160	1	240	40	12000	0	20000	32000	4000
161	1.5	300	40	18000	0	25000	43000	4500
162	2	600	40	24000	25000	40000	89000	4500
163	2.5	500	40	30000	30000	30000	90000	4000
164	1	240	40	12000	0	20000	32000	4500
165	2	480	40	24000	30000	30000	84000	4000
166	1	240	40	12000	20000	20000	52000	4500

167	1	150	40	12000	20000	20000	52000	4500
168	1.5	180	40	18000	25000	20000	63000	4500
169	2	450	40	24000	40000	30000	94000	4000
170	1.5	200	40	18000	25000	20000	63000	4000
171	1	240	40	12000	20000	20000	52000	4000
172	1	240	40	12000	20000	20000	52000	4000
173	2.5	550	40	30000	30000	35000	95000	4500
174	1	200	40	12000	24000	20000	56000	5000
175	2	400	40	24000	40000	30000	94000	5000
176	4	800	40	60000	48000	60000	168000	5300
177	4	750	40	60000	45000	60000	165000	5000
178	2	240	40	30000	24000	20000	74000	5300
179	2	320	40	30000	24000	25000	79000	5300
180	2	300	40	30000	30000	25000	85000	5300
181	2	300	40	30000	24000	25000	79000	5000
182	2	240	40	30000	25000	20000	75000	5300
183	2	240	40	30000	25000	20000	75000	5300
184	3	360	40	45000	60000	30000	135000	5300
185	2	300	40	30000	30000	25000	85000	5300
186	2	450	40	30000	20000	30000	80000	5300
187	1.5	300	40	25000	0	25000	50000	5000
188	3	450	40	45000	45000	30000	120000	5300
189	2	300	40	30000	25000	25000	80000	5300
190	4	750	40	60000	75000	60000	195000	5000
191	2	240	40	30000	24000	20000	74000	5300
192	2	240	40	30000	24000	20000	74000	5300
193	2	240	40	30000	24000	20000	74000	5300
194	2	400	40	30000	40000	30000	100000	5300
195	3	600	40	45000	60000	40000	145000	5300
196	2	320	40	30000	30000	25000	85000	5300
197	2	320	40	30000	30000	25000	85000	5300
198	2	480	40	30000	40000	30000	100000	5300
199	1.5	200	40	25000	0	20000	45000	5300
200	3	560	40	45000	45000	35000	125000	5000

Table 3: Marketing Cost in Trader's Level

No	Quantity (Kg)	Dry Rubber Contents (%)	Cost (Rp)			Total Cost (Rp)	Price (Rp/kg)
			Labors	Transportation	Retribution		
1	2000	55	100000	50000	50000	50056	7500
2	2400	50	100000	64000	50000	64052	7000
3	3700	55	100000	110000	50000	110058	7500
4	5500	50	100000	137500	50000	137554	7200
5	4900	50	100000	147000	50000	147055	7200
6	1500	50	60000	45000	50000	45056	7000
7	1200	60	48000	36000	50000	36067	7700
8	4800	50	192000	120000	50000	120058	7200
9	1000	60	40000	25000	50000	25069	8000
10	3600	50	144000	90000	50000	90060	7000
11	2000	55	60000	60000	45000	60066	6000
12	3200	50	96000	96000	45000	96062	5500
13	2500	55	75000	50000	45000	50068	5800
14	1300	55	39000	39000	45000	39069	5800
15	6400	60	192000	160000	45000	160075	6500
16	1000	55	30000	30000	45000	30071	6000
17	1200	55	36000	36000	45000	36072	5800
18	800	55	24000	25000	45000	25073	5800
19	800	55	24000	25000	45000	25074	5800
20	5500	50	165000	137500	45000	137570	5500
21	4200	50	50000	105000	40000	105071	5500
22	4700	60	50000	117500	40000	117582	7000
23	7000	55	100000	210000	40000	210078	6500
24	2500	50	40000	62500	40000	62574	6000
25	2000	50	40000	60000	40000	60075	6000
26	800	60	32000	20000	40000	20086	7000
27	3300	50	132000	82500	40000	82577	6000
28	1000	50	40000	25000	40000	25078	6300
29	800	50	32000	24000	40000	24079	6000
30	1200	60	48000	30000	40000	30090	7000
31	1300	50	39000	39000	35000	39081	6000
32	1800	50	54000	45000	35000	45082	6000
33	1200	55	36000	30000	35000	30088	5800
34	2400	60	72000	60000	35000	60094	6500
35	1300	50	39000	39000	35000	39085	6000
36	1600	50	48000	48000	35000	48086	6000
37	900	60	22500	27000	35000	27097	6500
38	3300	60	82500	82500	35000	82598	6500
39	1000	55	30000	30000	35000	30094	6000
40	7040	60	211200	176000	35000	176100	7000

Table 4: Rubber Price in Auction Market and World Rubber Market

Date	Auction Price (Rp)	Exchange Rate (US$ to Rp)	World Price (US$)	Convertion Price
11-Jan-06	7800	8960	1.69	15142.40
25-Jan-06	8000	8940	1.80	16092.00
8-Feb-06	8100	8720	1.96	17091.20
22-Feb-06	8300	8740	1.90	16606.00
8-Mar-06	8000	8695	1.92	16694.40
22-Mar-06	8400	8630	1.89	16310.70
12-Apr-06	8300	8505	1.94	16499.70
26-Apr-06	8000	8305	1.95	16194.75
10-May-06	7900	8260	2.01	16602.60
24-May-06	8100	8820	2.23	19668.60
7-Jun-06	8300	8895	2.31	20547.45
21-Jun-06	8500	8910	2.28	20314.80
5-Jul-06	9000	8580	2.47	21192.60
19-Jul-06	8900	8745	2.27	19851.15
9-Aug-06	9300	8580	2.20	18876.00
23-Aug-06	9000	8575	2.09	17921.75
6-Sep-06	8800	8570	1.97	16882.90
20-Sep-06	9000	8645	1.85	15993.25
11-Oct-06	9200	8725	1.85	16141.25
25-Oct-06	9600	8660	1.86	16107.60
8-Nov-06	9600	8630	1.68	14498.40
22-Nov-06	9200	8645	1.58	13659.10
13-Dec-06	9000	8575	1.62	13891.50
27-Dec-06	9200	8573	1.71	14659.83
10-Jan-07	9000	8515	1.77	15071.55
24-Jan-07	8900	8605	1.96	16865.80
7-Feb-07	8600	8555	2.04	17452.20
21-Feb-07	8400	8564	2.08	17813.12
7-Mar-07	8100	8705	2.01	17497.05
21-Mar-07	8300	8685	2.07	17977.95
11-Apr-07	8500	8597	2.15	18483.55
25-Apr-07	8200	8594	2.12	18219.28
9-May-07	8200	8394	2.22	18634.68
23-May-07	8400	8192	2.30	18841.60
6-Jun-07	8600	8279	2.24	18544.96
20-Jun-07	8900	8386	2.16	18113.76
11-Jul-07	8500	8496	2.00	16992.00

25-Jul-07	8300	8566	2.08	17817.28
8-Aug-07	8400	8808	2.17	19113.36
22-Aug-07	8500	8933	2.01	17955.33
5-Sep-07	9000	8898	2.07	18418.86
19-Sep-07	9100	8892	2.13	18939.96
10-Oct-07	9000	8596	2.16	18567.36
24-Oct-07	9200	8636	2.30	19862.80
7-Nov-07	9300	8678	2.40	20827.20
21-Nov-07	9400	8885	2.27	20168.95
5-Dec-07	9000	8835	2.43	21469.05
19-Dec-07	9100	8934	2.48	22156.32
9-Jan-08	8800	8955	2.54	22745.70
23-Jan-08	8600	8986	2.44	21925.84
6-Feb-08	8400	8727	2.58	22515.66
20-Feb-08	8700	8639	2.71	23411.69
5-Mar-08	8200	8596	2.70	23209.20
19-Mar-08	8400	8762	2.64	23131.68
9-Apr-08	8300	8713	2.66	23176.58
23-Apr-08	8000	8691	2.71	23552.61
7-May-08	8400	8727	2.75	23999.25
21-May-08	8600	8796	2.91	25596.36
11-Jun-08	8500	8836	3.10	27391.60
25-Jun-08	8200	8772	3.17	27807.24
9-Jul-08	8200	8703	3.24	28197.72
23-Jul-08	8300	8669	3.14	27220.66
6-Aug-08	8700	8586	3.06	26273.16
20-Aug-08	8500	8691	2.86	24856.26
10-Sep-08	8200	8855	2.79	24705.45
24-Sep-08	8400	8839	2.88	25456.32
8-Oct-08	8000	9157	2.31	21152.67
22-Oct-08	7900	9304	1.73	16095.92
5-Nov-08	8300	10663	1.78	18980.14
19-Nov-08	8400	11900	1.48	17612.00
10-Dec-08	8000	10863	1.14	12383.82
24-Dec-08	7800	10525	1.23	12945.75