

THE TRANSMISSION OF INFORMATION IN THE TRANSACTING OF PRIMARY PRODUCTS: THE CASE OF QUALITY IMPROVEMENT IN THAILAND'S NATURAL RUBBER PRODUCTION

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I. INTRODUCTION

SINCE the 1980s the worldwide demand for primary products has been sluggish, and producers in developing countries have been under strong pressure to create systems which can produce goods of the quality that buyers demand. However, it has often been the case that the producers have understood the buyers' calls for quality only as a demand for lower prices, and as result the calls have never led to efforts to improve quality. Such a problem happens because there is some defect in the transmission of information about quality when transactions take place for primary products.

In previous studies on primary products, interest has been focused mainly on the instability of prices for these products and on the relative decline in prices for manufactured goods [1] [17]. There has not been much interest paid to the institutions of transaction for primary products. However, it is these latter which are actually important to look at when discussing the improvement of quality in primary products. The reason for this can be explained as follows. For any primary product to be of value as a commodity, it has to be of the quality demanded by the buyer. Improving the quality of a primary product has been viewed as a matter of technological transfer and technological improvement. However, for a seller to know that improved quality is the target he needs to aim for, he first has to receive this information accurately from the buyer. Conversely, when a buyer does not have information about the quality of goods, he cannot make accurate decisions about transactions. Therefore, information needed for transacting goods has to be exchanged between the transacting parties. For this reason, a system for transmitting information about the quality of goods is incorporated into the institutions of transaction. Thus it is reasonable to believe that by analyzing the institutions of transaction themselves, it is possible to examine the system which adequately transmits information about the quality of primary products.

Information transmission in commodity transactions has for the most part been a subject dealt with in the field of economics of internal organizations [24]. In works on the subject, markets and organizations are contraposed as two institutions of transaction each characterized in the following way [2][10]. Markets are seen as institutions of transaction where decisions of whether transactions of goods will

take place or not are made at the time of each transaction and where information is transmitted by means of price indices attached to goods. On the other hand, organizations are seen as systems where information is transmitted by command instead of by price whenever the price mechanism fails to function. For both of these to be possible, the transacting parties must be connected in a relationship of continuous commodity transactions. In other words, these two institutions of transaction correspond either to a price or to a command system for transmitting information. In actual institutions of transaction, forms midway between these markets and organizations exist, but these can also be characterized under the two ideal types: markets or organizations [10][25]. Thus it is reasonable to analyze systems for transmitting information in the transaction of primary products by examining these two institutions of transaction.

The remainder of this study will focus on the production of natural rubber in Thailand. Thai natural rubber underwent a rapid improvement in quality during the first half of the 1980s which prepared the way for the rapid increase in exports that followed. This improvement in quality was achieved when a system for the transmission of organizational information was introduced into institutions of transaction which depended on the market. This study will try to clarify how this change in the institutions of transaction came about, and what change took place in these institutions as a system for transmitting information on quality.

II. BACKGROUND OF THAILAND'S RUBBER EXPORTS

Natural rubber is used for the most part as a raw material in the manufacture of automobile tires. For this reason the advanced countries with developed automobile industries are the main destinations for these exports. As can be seen from Table I, exports from Malaysia and Indonesia have gone primarily to the United States and Europe, while Thailand's exports have for the most part been sold to Japan. The Japanese found it necessary to rely on Thai natural rubber because although poor in quality, it was cheap.

Natural rubber can be of a variety of types depending on how it is processed. There are two types used in the manufacture of tires: ribbed smoked sheets (RSS) and technically specified rubber (TSR). RSS is made from solidified latex collected on the plantations and rolled into sheets of rubber known as unsmoked sheets (USS) which are then smoked. This smoking process maintains the natural composition of the rubber contained in USS while at the same time carrying its widely variable quality over to RSS. For this reason the grading of RSS is done visually according to international standard contained in the Green Book, with quality divided into five grades, 1 being the highest and 5 the lowest. TSR, on the other hand, is produced various types of raw rubber materials from which are then put through a high-temperature processing and finally solidified into blocks.¹ Un-

¹ TSR is produced from various raw materials such as latex, USS, cup-lumps (latex solidified in collecting cups), rubber-lace (latex solidified on the rubber tree). The composition of each raw material depends on the countries, producers, and kinds of TSR.

TABLE I
 QUANTITY AND DESTINATIONS OF RUBBER EXPORTS FOR THAILAND, MALAYSIA, AND INDONESIA

(1,000 tons)

	Japan		U.S.A.		Western Europe ^a		Total	
	Quantity	%	Quantity	%	Quantity	%	Quantity	%
Thailand								
1960	40.7	24.0	59.1	34.8	20.1	11.8	169.7	100.0
1965	53.4	25.7	6.4	3.1	81.2	39.0	208.1	100.0
1970	143.5	51.4	26.0	9.3	46.3	16.6	279.2	100.0
1975	188.6	56.3	29.4	8.8	7.9	2.4	334.7	100.0
1980	299.3	65.5	38.5	8.4	14.3	3.1	456.8	100.0
1985	348.0	50.8	81.2	11.9	43.4	6.3	684.9	100.0
1990	440.0	38.2	99.8	8.7	100.2	8.7	1,150.8	100.0
Malaysia^b								
1960	97.2	8.9	121.4	11.1	391.0	35.7	1,094.7	100.0
1965	46.9	4.5	125.2	12.0	301.1	28.9	1,040.5	100.0
1970	120.3	6.7	305.8	17.1	454.2	25.3	1,792.8	100.0
1975	65.0	3.4	363.7	19.1	468.4	24.6	1,904.2	100.0
1980	59.4	4.1	112.8	7.7	324.7	22.2	1,460.1	100.0
1985	91.1	6.1	141.0	9.4	332.6	22.2	1,496.9	100.0
1990	101.9	7.7	119.7	9.1	252.4	19.1	1,321.8	100.0
Indonesia								
1960	3.3	0.6	197.3	36.1	83.9	15.3	547.3	100.0
1965	91.2	13.3	295.3	43.2	91.1	13.3	683.7	100.0
1970	13.9	2.1	77.5	12.0	100.4	15.6	645.5	100.0
1975	17.6	2.2	198.6	25.2	64.5	8.2	788.3	100.0
1980	31.7	3.2	335.6	34.4	50.6	5.2	976.1	100.0
1985	26.8	2.7	468.6	46.8	34.5	3.4	1,000.9	100.0
1990	38.5	3.6	520.2	48.3	74.8	6.9	1,077.3	100.0

Sources: For the 1960 statistics for Thailand, *Rai ngan setakit rai duan* (Bank of Thailand), Vol. 18, No. 1 (January 1978); for the remainder, *Rubber Statistical Bulletin* (International Rubber Study Group), various issues.

^a Western Europe = the United Kingdom, France, former West Germany, and Italy.

^b Statistics for Malaysia from 1960 to 1975 included Singapore. The quantity of exports are the gross totals from Peninsular Malaysia, Sabah, and Sarawak.

like RSS, TSR is graded for quality based on tests of its chemical composition.

In Table II, which shows the percentage of the different types of natural rubber exported by producer countries, it can be seen that for Thailand RSS has made up the overwhelming share, with the percentage extremely high for the middle and low grades (grades 3–5). During the 1970s, moreover, the grading of these exports was unreliable as it was carelessly and inaccurately done and not in verification with the Green Book. For these reasons the quality of Thai natural rubber was low compared with that of Malaysia and Indonesia, and it did not suit the needs of European and U.S. tire manufacturers. U.S. manufacturers had shifted their demand to TSR because it was produced in small blocks/bales which were easy to handle; also its quality was stable because it was graded according to its chemical

TABLE II
QUANTITY AND PERCENTAGE OF EXPORTS BY RUBBER TYPE, 1981

(1,000 tons)

	RSS 1, 2	RSS 3	RSS 4, 5	RSS Total	TSR Total	Others	Total
Thailand							
Quantity	41.5	209.5	119.2	370.2	75.8	30.0	476.0
%	8.7	44.0	25.0	77.8	15.9	6.3	100.0
Malaysia							
Quantity	231.0	240.7	134.5	606.2	613.9	235.3	1,455.4
%	15.9	16.5	9.2	41.7	42.2	16.2	100.0
Indonesia							
Quantity	142.9	10.4	10.2	163.6	563.5	81.6	808.6
%	17.7	1.3	1.3	20.2	69.7	10.1	100.0
World							
Quantity	550.0	590.0	385.0	1,525.0	1,685.0	490.0	3,700.0
%	14.9	15.9	10.4	41.2	45.5	13.2	100.0

Source: Indonesia, State Plantations 1–29, Plantation Joint Marketing Association, *Situasi pasaran karet alam tahun 1990: sebagai tantangan bagi perkaretan nasional* [1990 natural rubber market situations: a challenge for the state rubber industry] (Jakarta: National Conference on Rubber, 1986), quoting International Rubber Study Group documents.

composition. Meanwhile most of the demand coming from Michelin (Compagnie Générale des Établissements Michelin), Europe's top tire maker, was for high-quality RSS.²

During the 1980s, however, exports from Thailand to Europe and the United States increased rapidly (see Table I). A major reason for this was the improvement that Thailand achieved in the quality of its rubber during the first half of the 1980s.³ To understand how this improvement came about, we have to look at why the quality of Thai natural rubber had been a problem.

III. INSTITUTIONS OF TRANSACTION FOR THAI RUBBER DURING THE 1970s

A. Production and Distribution Structure

The Japanese tire industry grew rapidly during the 1960s to supply the needs of the country's developing automobile industry.⁴ Lagging behind the European and

² A block of TSR weighs 33.33 kg while one RSS bale is 111.11 kg, making the former one-third the freight weight. Also in the 1970s shipments of RSS had not yet been containerized, and handling was not easy (from interviews with tire manufacturers in July 1987 and Japanese trading companies in January 1988). Commercial production of TSR began in 1965 [14, pp. 1–2].

³ The containerization of RSS shipments from the beginning of the 1980s and the growing popularity of radial tires for which RSS is the main raw material also contributing to the growth in demand for RSS (from interviews with Japanese trading companies in January 1988 and [15]).

⁴ Since the latter half of the 1950s, Japanese tire production for motor vehicles (including motorcycles) has continued to expand rapidly. The trend of growth in the volume of rubber used has been: 1955, 28,000 tons; 1960, 88,000 tons; 1965, 165,000 tons; and 1970, 370,000 tons [4, pp. 60–61].

U.S. tire makers technologically, Japanese manufacturers had no choice but to compete on price. For this reason they turned to cheap but low-quality Thai rubber instead of better Malaysian and Indonesian rubber. Also at that time Japanese tire manufacturing was labor-intensive, so even if low-quality raw materials were used, production line workers could be relied on to remove any foreign objects and bad pieces and thus prevent problems from arising.⁵ Under the circumstances, Thai rubber producers were content to leave quality as it was, and during the 1970s alone there were at least three occurrences of large-scale quality problems in rubber shipped to Japan that came to light.⁶

The first occurrence involved oil-spoiled rubber that came to light around October 1971. In this case a substance that appeared to be waste oil had been poured into the spaces between the rubber sheets in the bales in an apparent effort to pad the weight of the rubber.⁷ The second incident occurred in mid-1976 when the surfaces of rubber bales were discovered to have been painted with a heavier coating of lime than that specified, and figures had been juggled to make this extra amount of lime look like part of the weight of the rubber. The third occurrence came to light during the latter half of 1979 and concerned uncured RSS. This is a condition where USS has been insufficiently cured, and an excess of water remains in the RSS. At the time nearly three thousand tons of uncured RSS were discovered in Japanese ports, and it was further found that most of the Thai exporters had shipped uncured RSS. These findings led Bridgestone Corporation and Japanese trading companies to undertake a thorough survey of Thailand's rubber industry. Their findings produced the following description of that industry's production and distribution structure.

Thailand's rubber exporting was controlled by an oligopoly of a number of large-scale export companies, and Japanese trading companies for the most part carried on business with these large-scale exporters.⁸ Before the survey, the trading companies had presumed that these exporters controlled their own smokehouses, and all of the rubber they sold was made in these houses. However, it was found that there were some forty other small and medium-sized smokehouses that the large-scale exporters bought RSS from and which they mixed and exported along with the RSS produced in their own smokehouses. Many of these small and medium-sized producers had deficient or otherwise inadequate facilities and produced low-quality rubber. In addition there were middlemen dealers who paid cash to small holders to buy up supplies of USS which they then sold to smokehouses for production into RSS.⁹

⁵ It is said that Japanese tire manufacturers would find pieces of wood, metal, and even clipping shears in the bales from Thailand in those days. From interviews with tire manufacturers in July 1987.

⁶ From interviews with tire manufacturers in July 1987.

⁷ Waste oil with a specific gravity similar to that of natural rubber was used.

⁸ Up to 1979, the top five rubber exporters handled 74 per cent of Thailand's total rubber exports by weight [12, pp. 119–21].

⁹ According to the 1978 agricultural census, 91 per cent of the area under rubber cultivation was being grown by small holders cultivating less than 140 *rai* (22 ha) [20, p. 82].

Relying on this sort of distribution structure, Thai exporters usually concluded three-month forward delivery contracts with Japanese trading companies for the sale of RSS, and these exporters bought up USS at the start of the smoking process. With their selling price for RSS already fixed by their forward delivery contracts, should the market price rise during this time, the exporters' buying price would rise and their profit margin decline. The price of USS accounted for about 80 per cent of the cost of RSS; to this were added export duties calculated on the officially announced price at the time of export. In circumstances where the market price rose rapidly, it was possible for exporters to make little or no profit or even suffer losses.¹⁰ For this reason, when the price of RSS rose, exporters bought up USS while its margin of price rise was still small, or they quickly tried to buy up RSS produced by small and medium-sized producers even if the quality was questionable. Thus quality control in the purchasing of raw materials and the production process tended to be careless and haphazard. This was the case at the time of the uncured RSS problem. At that time exporters quickly bought up from small and medium-sized producers stocks of RSS that were still insufficiently smoked. Likewise when it appeared they might suffer losses because of price fluctuations, there was a strong tendency among rubber exporters to try to make up for these through the fudging and doctoring of weight and quality.

When market prices are rising, shortages arise in the supply of goods, and then even poor-quality commodities find ready buyers, which partly explains the cause of the irregularities. Importers buying on forward delivery contracts have a keen interest in buying up whatever stock they can as early as possible because it is highly profitable for them to conclude contracts while prices are still low. As a result everything becomes a seller's market which contributes further to the production of substandard goods. The heavy coated lime incident of 1976 and the uncured RSS problem of 1979 both occurred when market prices were rising or directly thereafter (Figure 1).¹¹

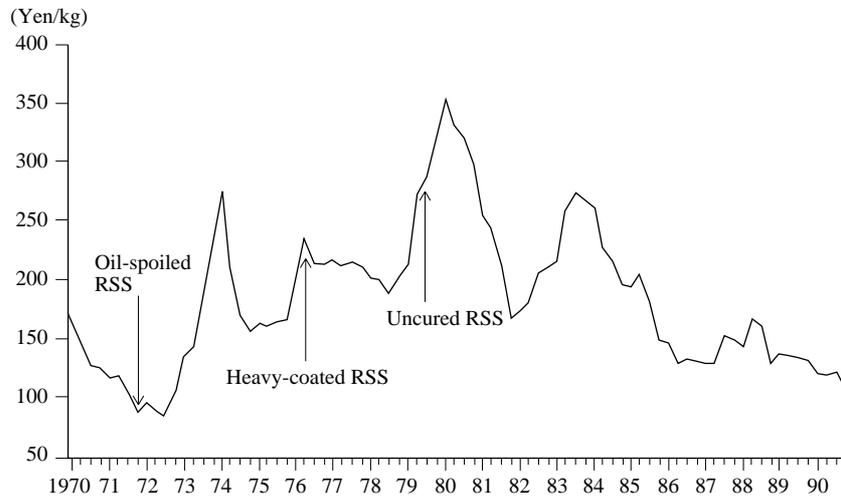
B. *Systems for Transmitting Information on Quality in Market Transactions*

The institutions of transaction in Thailand's rubber industry as described above can be understood as typical market transactions. From the stage of transacting USS at the plantation level up to the stage of passing RSS over to the tire manufacturer, there were no fixed arrangements in the relationships between transacting parties. These parties decided on each occasion whether a transaction would take place and with whom it would take place relying on price and quality indicators as indices. Within this type of market-dependent institution of transaction, it is expected that the goodness or badness of quality will be expressed in price differ-

¹⁰ See [7, pp. 48–54] for the method of calculating the export duties.

¹¹ In the incident of oil-spoiled rubber in 1971, it seems that exporters damaged the quality of the rubber when they saw their profits falling due to the rapidly falling international price which reduced the difference between the RSS export price and the USS farm-gate price (from statistics in [19, various issues] [21, various issues], and from interviews with tire manufacturers in May 1988). This incident can be seen as an attempt to cope with price fluctuations.

Fig. 1. Movement in the Average Quarterly Price of RSS 3, 1970–90



Note: TOCOM current delivery price.

ences and that this will be transmitted to the producer who will be induced into making efforts to improve quality. When transacting business within Thailand's rubber industry, however, the system for transmitting such information did not function.

There were two reasons for this failure. One was that in the grading system used, differences in quality were not accurately reflected as differences in price. USS, the raw material for RSS, is an agricultural commodity whose widely varying quality also shows up in RSS. At the same time RSS is an industrial raw material which is transacted in large quantities, and it would be very expensive to check the quality and set the price for each sheet. Therefore the expedient used when grading RSS is to regard all sheets within a given range of quality as having the same quality. As a result, differences in quality exist within a stock of RSS having the same price.

A further problem is that grading is done visually which means that a certain amount of arbitrariness on the part of the inspectors also comes into play. At those times when a seller's market is prevailing, grading becomes more nebulous, while in the opposite situation it can become more stringent than usual. Thus in the grading system for transacting RSS, the buyers' demands for quality cannot accurately be reflected by price differences. This sort of grading problem, where the outer appearance of the commodity and indicators of its inner content transmit ambiguous information about quality, can be resolved only when a producer of the commodity establishes a reliable reputation (a brand name). In the case of natural rubber, the name of the producer along with the grading standards are clearly marked on the bales, so a buyer is able to purchase rubber made by a specific producer. Thus if a particular producer has supplied RSS of a steady weight and quality over

a long period of time, its product becomes established as a brand name.

But there was still the second reason for the failure of the Thai rubber market to transmit information on quality. Natural rubber is a speculative commodity, and both buyers and sellers place priority on gaining profits from price fluctuations. RSS can experience wide and rapid price fluctuations for both supply and demand reasons. For one thing, the production of the raw material (USS) is greatly affected by natural conditions. Also, production is concentrated in only a small number of countries. Added to these is the fact that natural rubber is a strategic military commodity, and demand can be greatly affected by changes in the international political climate.

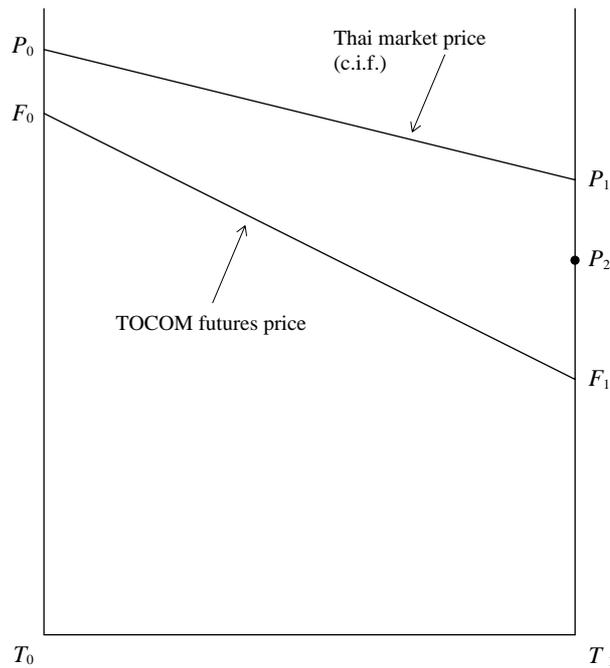
This sort of market environment produced the following features in Thailand's domestic institutions of transaction for natural rubber. (1) Smokehouses/exporters producing RSS relied on market transactions for both purchasing the raw material (USS) and selling the finished product (RSS). (2) There was a time lag between the contract for the sale of the final product and the purchase of the raw material during which it was possible for market conditions to change. (3) Thailand maintained foreign exchange controls which made it impossible to use overseas exchanges for hedging. For these reasons, price fluctuations greatly affected the profits of Thai natural rubber producers. After completing their forward contracts for the sale of RSS, there was always the danger of incurring losses should there be a sudden rise in price.

Meanwhile on the Japanese market, the wide and sudden fluctuations in the price of Thai RSS made it the object of futures trading on the Tokyo Commodities Exchange for Industry (TOCOM). The profits from trading on this exchange were of crucial importance for Japanese trading companies importing natural rubber for the following reasons.

Normally the TOCOM price is lower than the Thailand c.i.f. price.¹² Japan's oligopolistic tire manufacturers as a rule quoted prices based on the TOCOM price when purchasing rubber from the importing trading companies which meant that the manufacturers' purchasing price was lower than the Thai c.i.f. price. A trading company could hope to profit in the transaction even at this lower price because it was able to compensate for its loss from the transaction with the tire manufacturer using the profits it gained from futures trading on the TOCOM. As can be seen from the example in Figure 2, when a trading company concludes a contract to buy rubber in the Thai market at T_0 point in time, its c.i.f. price in Japan can be given as P_0 . The trading company now carries out three-month forward selling on the TOCOM at price F_0 . If after three months (T_1) the price on the TOCOM falls to F_1 and the rubber spot market price falls to P_1 , the trading company can now buy the same amount of rubber as it had forward sold on the TOCOM and earn a profit of $F_0 - F_1$ per kg. Meanwhile negotiations between the trading company and the tire

¹² This is because trading companies usually sell futures for hedging purposes on the Japanese market, so sales become relatively large. According to an interview in July 1987 with a market exchange official, the TOCOM price has almost never gone above the Thai market price, except at such unusual times as the first oil shock.

Fig. 2. Explanation of Futures Trading and Rubber Market Price (Example of a Falling Market)



Source: Prepared by author.

Note: Tokyo c.i.f. price calculated based on the contracted price with the Hadyai producers/exporters.

manufacturer set the selling price of rubber to the latter at P_2 . This reflects the oligopolistic power relationship of the manufacturer vis-à-vis the trading company, as P_2 will be lower than the spot rubber c.i.f. price (P_1) at T_1 . And since the market price has fallen during this time, P_2 will also be lower than the spot rubber forward delivery contract price (P_0) set at T_0 . However, if $F_0 - F_1$ is larger than $P_0 - P_2$, the trading company can secure a profit from this import transaction.

Whether a company will profit or lose in its futures trading on the spot market depends greatly on how the market price moves. If it climbs rapidly, the company can reap big profits on the spot market, but losses on futures market. Foreign exchange fluctuations also affect the profit margins on futures transactions. Trading companies that were able to predict these market price movements and profit from them were the ones that survived in the Thai rubber market.¹³

¹³ In order to secure profits from futures trading, the trading companies competed fiercely in rubber dealing which intensified price-cutting competition among the companies. However, not all companies trading on the futures market make profits. As a result, the number of trading companies engaged in rubber importing declined from twenty-eight companies in 1967 to eighteen companies in 1980 [15, p. 29].

As can be seen from the above, for both buyers and sellers of RSS in the Thai market, seeking profits from price fluctuations was the primary concern. For this reason, both sides paid attention to price only as a signal for such fluctuations. It did not function as a signal to transmit differences in quality. If anything, signals of price fluctuations actually led to the deterioration of quality.

IV. REFORMS IN THE INSTITUTIONS OF TRANSACTION DURING THE 1980s

A. *Changes in the Production and Distribution Structure*

At the end of the 1970s, Japanese buyers came to realize that the quality of the rubber they purchased in Thailand had to be improved. Two developments can be said to have brought this about. One took place within the international tire industry. From around the end of the 1970s, when the Goodyear Tire and Rubber Co. and Michelin, the number one and number two tire companies in the world in sales, were reporting continued sales growth, the number three tire maker, Firestone Tire and Rubber Co., began to report worsening earnings, while the number four company, Dunlop-Pirelli Union, announced that the Dunlop side of the partnership was cutting back on its tire division [16, pp. 397–404]. The situation for these smaller manufacturers produced a feeling of crisis at Bridgestone, the number five tire company. It realized that if it was to keep up its pursuit of the big two and not be eliminated in the competition, it would have to improve the quality of the tires it manufactured.

The second development took place at Bridgestone itself. From around this same time, the company began mechanizing and automating its tire production. The elimination of workers from the production line who could watch for irregularities in quality increased the likelihood that substandard raw materials would pass through unnoticed; and machinery stoppage due to foreign objects in the rubber would drive up costs. If the quality of the natural rubber that the company used as its raw material was not standardized, it would not be able to produce high-quality low-cost tires. These two developments compelled Bridgestone to embark on a full-scale endeavor to improve the quality of Thai rubber.¹⁴

From its 1979 survey into the production and distribution structure of Thailand's rubber industry, Bridgestone had come to understand that it needed to build a system that would prevent price fluctuations from causing fluctuations in quality. To achieve this end, the company laid out the following measures. (1) It sought to cut off transactions between Thai exporters and small and medium-sized rubber producers which destabilized quality by letting these latter export RSS directly. However, this measure would have been meaningless if these small and medium-sized producers had remained as simply makers of poor-quality rubber. Therefore (2) towards these producers, the company provided guidance on production manage-

¹⁴ From interviews with Japanese trading companies in September 1987 and tire manufacturers in July 1987.

ment and also carried out checks of their rubber stocks before they were shipped from the smokehouses. At the same time, (3) as part of its production management system, Bridgestone purchased rubber only from those producers whom the company regarded as having achieved the approved level of quality.

To implement these measures, Bridgestone stationed technicians in Thailand's rubber producing areas to make regular inspections of the producers' production and management. Up to this time Japanese tire makers had purchased practically all of their natural rubber through Japanese trading companies, and it was these companies which had to carry out on-site checks of rubber stocks.¹⁵ For this reason, Bridgestone decided to purchase rubber only from those companies which had their own personnel stationed in the rubber producing areas. As a result, during 1981 three Japanese trading companies set up branch offices in Hadyai, the center for the rubber industry in southern Thailand, and began carrying out on-site inspections.

From May 1982, Bridgestone began stationing its own technical personnel in Thailand. Their first step was to set up a system for purchasing rubber directly from small and medium-sized producers. At that time, some producers, having accumulated capital during the rising market of the late 1970s through spot sales of RSS to large-scale exporters, were seeking to enter the export business using their accumulated funds. From the start of 1981, Japanese buyers responded by supporting these small and medium-sized producers and urging them to register as exporters [15, p. 50]. As a result, during 1981–82 there was a rapid increase in the number of Thai rubber exporters. A look at the membership list of the Thai Rubber Traders' Association shows that among the sixty-three companies that became members between 1968 and 1986, thirty-one of these joined during the three years from 1981 to 1983 [18]. This influx destroyed the oligopolistic grip of the large-scale Thai rubber exporters.

While getting the small and medium-sized rubber producers to register as exporters, the Bridgestone and Japanese trading company technicians stationed in Thailand traveled around to the producers giving technical guidance. Smokehouses/exporters at the time managed their companies with an eye on the market price trying to maximize profits rather than on producing a good product. They had little desire to invest capital expressly for the upgrading of equipment. So the Bridgestone technicians began by going around introducing techniques for raising quality that did not require much capital outlay. They started with the accurate sorting of RSS. A double-checking procedure was introduced whereby the on-site supervisor would recheck the work of the sorters who visually sorted the rubber sheets into grades and also cut out bad spots with shears. The technicians then moved on to giving technical guidance on the smoking process. This entailed such measures as getting the smokehouses to install thermometers in their kilns, thereby eliminating reliance on intuition and guesswork in heat control; getting them to

¹⁵ The percentage of Japanese imports of natural rubber purchased directly by users was very small into the 1970s: 1953, 8 per cent; 1963, 3 per cent; 1973, 0.1 per cent; and 1979, 1 per cent [15, pp. 28–29].

improve the design of their kilns so that smoke would spread evenly over the rubber; making sure the sheets of rubber draped over the bamboo poles did not overlap each other at all, and that the spacing between the bamboo poles was open at least a certain distance. Technical guidance then moved to the presmoking process where steps were taken to see that the USS was washed well which included such matters as increasing the size of washing tanks [9, pp. 5–7].

Once producers had achieved a specific level of production management, Bridgestone bought RSS from them on a preferential basis. As a result, such producers came to be recognized as Bridgestone “certified producers,” and RSS produced at their smokehouses came to be informally called “BS grade” or “BS type.” However, this did not mean any special standard just for Bridgestone use. Rather this was the standard which accurately followed the grading criteria of the international standards set down in the Green Book.

But Japanese technical guidance did not bring about quick economic benefits for the producers/exporters who introduced the new measures. This guidance had started by introducing improvements at the sorting stage, and one result was that much of the rubber which hitherto would have been RSS 3 was now graded as RSS 4. Thus at the start of Bridgestone’s efforts, producers saw an increase in the volume of their lower priced RSS 4 which of course meant a decrease in their earnings.¹⁶

Despite the disadvantages at the start, the producers/exporters continued with the improvements introduced into their production management, and during the course of 1983, 70–80 per cent of all the rubber producers in Thailand became certified producers. Why was it possible to get such a high percentage of producers to join Bridgestone’s program?

The first reason was that the negotiating strength on the buyers’ side had grown stronger. A large number of small and medium-sized producers had entered on the sellers’ side breaking the oligopolistic hold of the large-scale producers/exporters. These new entrants were greatly dependent on exports to Japan and thus had little choice but to accept Bridgestone’s guidance. One example was Thaisan Rubber Export Co., Ltd., a newly established company that had promptly accepted Bridgestone’s technical guidance. In 1983 the company exported 70 per cent of its rubber to Japan.¹⁷ Also Bridgestone, the largest consumer of natural rubber in Japan, would only purchase rubber from Japanese trading companies with personnel stationed in Hadyai, and this helped restrain competition among the trading companies when buying rubber.

Secondly, Bridgestone showed producers that it would provide the incentive of a better price for better quality. As mentioned earlier, until the late 1970s Bridgestone purchased most of the natural rubber it needed from Japanese trading companies, and it could buy it at a price that was lower than the c.i.f. price set by the Hadyai market. However, this method of transacting rubber did not communi-

¹⁶ From interviews with Thai exporters in August and September 1987, and February 1992; and [9, p. 6].

¹⁷ From interviews with Thaisan Rubber Export Co., Ltd. in August 1987.

cate Bridgestone's desires for better quality to the Thai rubber producers. So Bridgestone stepped in directly with its program of quality control and began to buy up rubber directly from those producers who met its standard of quality (the certified producers), thus bypassing the Japanese trading companies. Bridgestone also set the price it presented to its certified producers, especially in the beginning, a little higher than the local market price. By purchasing directly, Bridgestone had to pay a higher price for its raw material. At this time, however, by having its own purchasing route, it came to have more power than it had before to demand lower prices for the rubber it purchased through trading companies.

The Japanese trading companies for their part did not sell to Bridgestone all of the RSS they handled, and the price quoted by the tire makers was below the Thai c.i.f. as mentioned before. For these reasons, especially when Bridgestone first began its direct purchasing, the trading companies were not always able to match the price that Bridgestone offered, even when they purchased rubber from certified producers.

As a result, rubber producers came to perceive Bridgestone's high buying price to certified producers as the "premium price," and this became an incentive for improving quality. Thereafter as the volume of Bridgestone's direct purchasing increased, the trading companies were compelled to offer the same premium price for "BS grade" in order to compete.¹⁸

The position of the Japanese rubber buyers took on oligopolistic strength in the early 1980s while that of the Thai sellers was weakened by the influx of a large number of new small and medium-sized producers/exporters, many of whom were attracted by the incentives offered by Bridgestone to produce better quality natural rubber. Highly dependent on the Japanese market, these producers/exporters sought to maintain their business dealings with Bridgestone and accepted its guidance in the management of their rubber production.

B. *Reform of the System for Transmitting Information on Quality*

The above changes within the rubber industry's institutions of transaction which affected the system for transmitting information on quality had the following noteworthy characteristics. Firstly, there was the adoption of an organizational method for transmitting information on quality. Instead of relying on market transactions which transmit information via price about the quality demanded, the buyer (Bridgestone) adopted the approach of providing information directly and continuously to the production processes. At the same time, however, a second characteristic was that Bridgestone made every effort to maintain market transaction arrangements in the transacting of the commodity (RSS). There were no long-term business contracts whatever exchanged between the Japanese buyers and Thai sellers. Since the quality which Bridgestone required was in conformity with international standards, the improvement in quality did not aim at developing products suitable only for Bridgestone, but also for any other tire manufactures who pur-

¹⁸ From interviews with Japanese trading companies in February and September 1992. The percentage of natural rubber purchased directly by users (by and large tire manufactures) grew rapidly in the 1980s: 8 per cent in 1980 and 25 per cent in 1985 [15, p. 29].

TABLE III
PERCENTAGE OF THAI EXPORTS OF RSS BY GRADE

(%)

	RSS 1	RSS 2	RSS 3	RSS 4	RSS 5	Total
1970	0.6	5.7	58.5	30.2	5.1	100.0
1971	0.8	4.9	58.6	31.6	4.1	100.0
1972	0.9	5.5	62.1	28.2	3.4	100.0
1973	1.0	4.8	64.7	25.6	3.9	100.0
1974	1.2	7.6	60.1	26.2	4.8	100.0
1975	1.2	5.6	61.1	26.9	5.2	100.0
1976	1.1	5.6	64.7	23.6	5.0	100.0
1977	1.4	6.8	65.7	23.3	2.9	100.0
1978	3.6	6.8	64.6	23.0	2.0	100.0
1979	1.1	8.7	67.1	21.4	1.6	100.0
1980	1.2	7.9	64.7	23.6	2.6	100.0
1981	2.8	8.4	56.7	28.2	3.9	100.0
1982	3.0	9.3	64.0	19.9	3.8	100.0
1983	1.5	9.2	65.6	19.9	3.8	100.0
1984	1.7	8.8	68.7	17.9	2.8	100.0
1985	3.5	8.9	69.4	15.4	3.1	100.0
1986	2.8	9.1	71.1	14.4	2.6	100.0
1987	2.2	9.5	72.5	12.8	3.0	100.0
1988	1.1	4.2	78.7	13.5	2.5	100.0
1989	1.1	5.5	78.2	12.6	2.6	100.0
1990	1.9	5.0	73.2	16.3	3.6	100.0

Source: Thailand Rubber Research Institute, *Thailand Rubber Statistics*, various issues.

chased rubber or the market. Thus by making every effort to maintain market transaction arrangements, Bridgestone was able to transmit information through organizational arrangements about quality through the use of economic incentives in market transactions (Bridgestone's premium price) as well as through economic pressure (the Japanese buyers' oligopolistic position).

As improvements in the production process moved ahead, the volume of RSS 3 increased vis-à-vis that of RSS 4, and Thai exporters were able to start selling their own RSS of a price one grade higher. Production improvements also meant that within the same grade of RSS, the variability of quality was reduced to a point where it was no longer a problem. For these reasons even the "BS grade" brand name eventually became meaningless, and the premium ceased to be paid. The direct guidance of production management by Bridgestone technicians was also terminated in October 1985. These developments indicate that within the Thai rubber market a system had come into existence where needed information on quality was now being transmitted by price differences in accordance with grading that conformed to international standards.

The effects of quality improvement for Thailand's rubber industry can be seen in Table III which shows the volume for each grade of RSS exported from Thailand. In the past, the increase in RSS 3 and decline in RSS 4 was due to lenient grading when a sellers market prevailed during times of bullish rubber prices. However,

TABLE IV
QUANTITY OF THAI RUBBER EXPORTS BY TYPE AND DESTINATION

(1,000 tons)

	RSS			TSR		
	Japan	U.S.A.	Western Europe ^a	Japan	U.S.A.	Western Europe ^a
1980	245.8	4.8	13.6	40.3	30.9	1.1
1981	263.7	7.5	12.3	36.9	34.6	0.0
1982	266.2	11.0	11.1	29.5	37.4	0.1
1983	269.5	23.9	9.8	21.5	45.1	0.0
1984	266.1	25.0	17.1	26.2	40.7	0.6
1985	285.5	31.8	41.2	34.0	49.8	1.9
1986	306.8	34.0	54.4	39.9	52.4	2.9
1987	332.7	39.7	51.9	40.7	50.7	0.2
1988	367.6	32.4	55.6	40.8	56.1	0.1
1989	388.3	31.6	62.0	43.2	51.1	0.1
1990	358.9	41.5	84.2	46.4	50.6	1.1

Source: Thailand, Ministry of Commerce, *Foreign Trade Statistics of Thailand*, various issues.

^a Western Europe = Britain, France, former West Germany, and Italy.

from 1984 onward, after improvements in production management had taken effect, the percentage of RSS 3 increased while that of RSS 4 decreased even with the prevailing bear market.

The improved quality of Thai rubber did not lead to an increase in the top grades of RSS (grades 1 and 2). But the uniformity of quality that was achieved in RSS 3 made it good enough for the manufacturing of tires. Thus it became possible to purchase natural rubber of the required quality at a relatively cheap price when compared with that of RSS 1 and 2 grades.

While Thai rubber was undergoing its process of quality improvement, European and U.S. tire manufacturers were increasing their demand for RSS. At the end of the 1970s amid fierce competition among the international tire makers, Goodyear began purchasing RSS (or Thai TSR mixed with RSS) suitable for producing radial tires which were becoming popular in the United States. Meanwhile Michelin began buying up middle-grade RSS in an effort to cut costs. Thus tire makers in advanced countries other than Japan also started looking to the Thai market. Table IV gives Thailand's exports of natural rubber by type and by country of destination. It shows clearly that exports of RSS to Europe and the United States have been increasing. The already-mentioned Thaisan Rubber Export Co., Ltd. in 1987 brought its exports to Japan down to 30 per cent while raising those to Europe and China to 30 per cent respectively.¹⁹ In that same year the export volume of this newly established company made it Thailand's number two rubber exporter [22, August 28–September 2, 1989].

¹⁹ From interview with Thaisan Rubber Export Co., Ltd. in August 1987.

V. CONCLUSION

This study has looked at factors involved in the rapid improvement of quality in Thai natural rubber during the first half of the 1980s, explaining them through the changes in the institutions of transaction between Japanese buyers and Thai sellers. In essence these changes entailed improving the system for transmitting information about quality by introducing an intermediate system between market and organization into the then existing framework for carrying out market transactions. This "intermediate system between market and organization" refers to the means operating between the Thai rubber producers/exporters and the Japanese trading companies or Bridgestone, whereby both sides relied on the market for transacting the commodity while at the same time relying on the organizational approach of technical guidance for transmitting information on quality.

In communicating its demands for improvement in the quality of Thailand's rubber, Bridgestone as the buyer turned to an organizational approach for transmitting this information because price was not functioning as a medium for transmitting such information. Nevertheless, the transacting of the commodity was left to reliance on the market due to the nature of natural rubber as a commodity, as well as because of the characteristics of the transacting parties and the institutions of transaction.

RSS possesses both commodity characteristic and the institutions of transaction that are suited to market transactions. Natural rubber at its raw material stage of production is strongly affected by the surrounding natural conditions; and in the case of RSS, it is technically more difficult to standardize and specify quality in its production than it is for TSR, making a wide variability in quality inevitable. Added to this is the large number of producers involved which necessitates acceptance of a commonly recognized grading system among the transacting parties. At the same time, because natural rubber is a natural product, its price is unstable. With the common grading system and instability of price a given, futures trading arises on the market exchange. Here price fluctuations can be hedged, and the transacting parties eliminate the effects of price fluctuations on their earnings.

Looking at the characteristics of the transacting parties, the Thai rubber producers were small-scale operators, so even if a Japanese buyer had concluded a contractual arrangement with a producer and carried on systematic transactions, he could not have procured a large enough volume of rubber. Moreover, most of the plantations that supplied the raw rubber to the smokehouses were small holders. The large number of small operators on the production side made it extremely difficult to bring any hierarchical control to the production of natural rubber. Furthermore, Japanese tire manufacturers could procure low-priced rubber from Japanese trading companies which managed to gain profits from price fluctuation through futures trading on the commodities exchange. Therefore, for the tire manufacturers there was a substantial economic benefit in continuing with transactions through the market.

Although maintaining market transaction arrangements for transacting the com-

modity, Bridgestone used its strength as an oligopolistic buyer and price incentives to introduce an organizational approach for the transmission of information on quality. In so doing, the production process for Thai natural rubber was improved, the grading system used in market transactions began to provide needed information to buyers, and ultimately even the need for organizational intervention for the transmission of information on quality became unnecessary.

The characteristics of the institutions of transaction used between the Thai and Japanese parties become all the more clear when compared with the methods of the European and U.S. tire manufacturers for purchasing natural rubber from Malaysia and Indonesia. For these manufacturers, the major means of procuring rubber has been direct purchasing through agents from rubber estates having their own smokehouses.²⁰ For the most part they have relied on long-term contracts or on the constant purchasing of a fixed volume of rubber irrelevant of price fluctuations.²¹ Some of these manufacturers even own their own rubber estates.²² The European and U.S. tire makers have adopted such forms of transaction to remove the risk of market and price fluctuations, and also because the different manufacturers have needed natural rubber products of specified quality. Goodyear, for example, produces TSR of its own specification in Indonesia, while in Malaysia Michelin uses its own production methods to produce an RSS that it calls "Michelin rubber."²³ To have products made that complied with their special needs, tire makers have been compelled to conclude on-going transaction relationships with specific rubber producers. Through such relationships, the buyer can eliminate the effects that price fluctuations have on quality control and can also communicate his own demands on quality directly to the seller.

With these types of transaction arrangements, buyers of natural rubber do not need to resort to price hedging on the futures market. Moreover, TSR is made to the specialized quality required by each consumer, making it difficult for it to be traded on the commodities exchange. For these reasons, both the London and New York commodities exchanges suspended futures trading in rubber in the mid-1980s.²⁴ By contrast, in Japan where trading companies import large amounts of

²⁰ For example, Goodyear in 1992 purchased 75 per cent of its natural rubber from its subsidiary, Goodyear Orient Co. [23, p. 1].

²¹ For relevant information on Malaysia, see [8, pp. 45–46] [3, p. 313]; on Indonesia, see [5, pp. 11–12]. On the matter of constant purchases, European and U.S. tire makers feel that if they continue purchasing the same volume of rubber even with price fluctuations, the price over all will settle to the average which is the effect that hedging is supposed to have (from interviews with TOCOM in July 1987 and Japanese trading company in January 1988).

²² According to 1977 data, European and U.S. tire manufacturers owned estates covering 23,000 ha in Malaysia and 45,000 ha in Indonesia. At the time, this equaled 4 per cent and 10 per cent respectively of total rubber estate area [13, p. 46].

²³ From interviews with Japanese trading companies in January 1988.

²⁴ From interviews with TOCOM in July 1987 and Japanese trading companies in January 1988; also [6, pp. 316, 318]. Futures trading on the London exchange began to decline from around 1984 due to the rise in the direct transacting of rubber, and in 1987 futures trading was suspended. At present the price shown in London is the index price based on Malaysia RSS 1 set by the brokers and dealers committee (from an interview with the Association of the International Rubber Trade in July 1993). At the beginning of 1990s, the direct transacting of natural rubber internationally reached 60–70 per cent of total trading [11, p. 3].

natural rubber through market transactions, these companies remain active to this day trading futures on the exchange [6, p. 319].

In the above various ways, the characteristics of the transacting parties as well as the particular characteristics of the commodity reflect the sort of institutions that the transaction of a primary product takes. Therefore, the author does not intend to assert that the institutions of transaction between Japanese buyers and Thai sellers for natural rubber can be applicable to every other case of primary commodity trading. However, when viewed against studies on the institutions of transaction for other primary products, the present study contains the following implications.

This study has shown that a system for transmitting information regarding quality is incorporated into the institutions of transaction for a primary product, and when evaluating the institutions of transaction, the accurate transmitting of information on quality also becomes an important criterion. Moreover, many primary products are produced by a large number of small-scale operators and in environments where they are easily affected by their natural surroundings. Thus the characteristics of both commodities and trading partners have long possessed characteristics suited to market institutions of transaction. But as in the case of natural rubber, when there is a change in the substance or level of quality brought about by the requirements of technological progress on the buyer's side of the primary product, the long-standing system may no longer be able to transmit accurate information about quality. At the same time, circumstances may be such that it becomes difficult to introduce organizational transactions for the commodity. This study shows that the employment of an intermediate system of transaction between market and organization is one way of coping effectively with such conditions.

This study also has shown that by utilizing an intermediate system of market and organizational transaction, not only was there an improvement in the quality of Thailand's natural rubber, but Thai producers/exporters experienced an expansion in their export markets. Improving the quality of a primary product by specializing to the demands of a particular buyer means in effect that the market becomes unstable when there is a change in that buyer's demands. In the transacting of primary products, the main question is one of long-term stability in market opportunities, especially where this affect the long-term economic development of the developing countries who comprise most of the exporters. In that sense, the value of this study lies in its examination of reform in the institutions of transaction through quality improvement of primary products as a means for expanding market opportunities for the sellers many of whom are developing countries.

REFERENCES

1. ADAMS, F. G., and BEHRMAN, J. R. *Commodity Exports and Economic Development: The Commodity Problem and Policy in Developing Countries* (Toronto: Lexington Books, 1982).
2. ARROW, K. J. *The Limits of Organization* (New York: W.W. Norton & Co., 1974).
3. BARLOW, C. *The Natural Rubber Industry, Its Development, Technology, and Economy in Malaysia* (Kuala Lumpur: Oxford University Press, 1978).

4. Bridgestone Corp., Fifty-year company history editing committee, ed. *Burijisuton taiya 50 nenshi shiryō* [Fifty-year history of the Bridgestone Corp.: documents] (Tokyo: Bridgestone Corp., 1982).
5. BUDIMAN, S. "The Indonesian Natural Rubber Export: Development and Changes," Paper presented at International Rubber Forum of International Rubber Study Group, Ottawa, 1991.
6. CARR, J. D.; JUMPASUT, P.; and SMIT, H. P. *The World Rubber Economy, Changes and Challenges* (n.p.: International Rubber Study Group / Social Institute, Free University, 1988).
7. DANU KUNJANATKUNAVUT. "Financial and Distributional Effects of Public Sector Policy toward Rubber" (Master's thesis, Thammasat University, 1983).
8. Economic and Social Commission for Asia and Pacific. *Transnational Corporations and the Rubber Industry of Malaysia: Patterns of Control and the Distribution of Net Benefits* (Bangkok, 1979).
9. HACHIYAMA, Y. "Tennen gomū no hinshitsu kanri no omoide" [A reminiscence about natural rubber quality control], unpublished memorandum, 1985.
10. IMAI, K.; ITAMI, T.; and KOIKE, K. *Naibu soshiki no keizai gaku* [Economics of internal organizations] (Tokyo: Tōyō Keizai Shimpōsha, 1982).
11. JUMPASUT, P. "A Summary and Highlights of the Questionnaire Response on NR Price Determination," Paper presented at 34th Assembly of the International Rubber Study Group, Singapore, 1992.
12. KROEKKIAT PHIPHATSERITHAM. *Wikro laksana kan pen chao khong turakit yai nai prathet thai* [Analysis of the characteristics of owning big businesses in Thailand] (Bangkok: Thammasat University Press, 1981).
13. NG CHOONG SOOI, YAP CHIAT BINE, and YUSOF BASIRON. *Improving the Structure of World Trade in Natural Rubber* (Kuala Lumpur: Malaysian Rubber Research and Development Board, 1979).
14. NG YU TONG and ABUDUL AZIZ BIN YOUNG KAMARUDDIN. *Patterns of Standard Malaysian Rubber Expansion, 1965–1978*, RRIM Technology Series Report No.12 (Kuala Lumpur: Rubber Research Institute of Malaysia, 1984).
15. Rubber Trade Association of Japan, Commemorative issue editing committee. *Nihon gomū yunyū kyōkaishi 40 nen no ayumi* [The past forty years of the Rubber Trade Association of Japan] (Tokyo: Rubber Trade Association of Japan, 1992).
16. SHINOHARA, T., ed. *Taiya nenkan, 1982* [Tire yearbook, 1982] (Tokyo: Tire Weekly Co., 1982).
17. SINGER, H. W.; HATTI, N.; and TANDON, R., eds. *International Commodity Policy*, Part 1 (New Delhi: Ashishi Publishing House, 1987).
18. Thai Rubber Traders' Association. *List of Ordinary Members of the Thai Rubber Traders' Association* (Bangkok, 1987).
19. Thailand, Ministry of Agriculture and Cooperatives. *Agricultural Statistics of Thailand* (Bangkok).
20. Thailand, National Statistical Office. *1978 Agricultural Census Report, Thailand* (Bangkok, n.d.).
21. Thailand Rubber Research Institute. *Thailand Rubber Statistics* (Bangkok).
22. *Than sethakij*.
23. WELLS, H. M. "Keynote Lecture" (International Rubber Forum), photocopy (Wembley: International Rubber Study Group, n.d.).
24. WILLIAMSON, O. E. *Markets and Hierarchies, Analysis and Antitrust Implications* (New York: Free Press, 1975).
25. ----- . *Economic Organization* (London: Wheatsheaf Books, 1986).