

MARKET PERFORMANCE OF THE CORN SEED INDUSTRY IN EAST JAVA

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ABSTRAK

Penelitian ini bertujuan untuk mengetahui kinerja pasar industri benih jagung di Provinsi Jawa Timur. Dalam hal efisiensi produktif, produsen lokal lebih unggul dari perusahaan multinasional. Walaupun demikian, volume benih jagung yang terjual oleh perusahaan multinasional jauh lebih banyak dibanding produsen lokal. Perusahaan multinasional mampu menghasilkan berbagai varietas benih jagung hibrida, tidak demikian halnya dengan produsen lokal. Produsen lokal maupun perusahaan multinasional mengalami penurunan volume penjualan selama empat tahun terakhir. Pedagang besar-pengecer mempunyai harga beli dan harga jual yang lebih murah dari pedagang pengecer, tetapi memperoleh keuntungan lebih tinggi. Hanya sedikit pedagang besar-pengecer, yang juga sebagai distributor, secara progresif menjual benih jagung. Secara umum, kinerja pasar benih jagung tidak terintegrasi pada tingkat perusahaan ke pedagang besar maupun dari pedagang besar ke pengecer. Hal ini menunjukkan bahwa produsen memberi kebebasan bagi para pedagang untuk menentukan margin pemasaran.

Kata kunci: *kinerja pasar, efisiensi, benih jagung, hibrida, Jawa Timur*

ABSTRACT

This study is aimed at assessing market performance of the corn seed industry in East Java Province. In terms of productive efficiency, the local producers were better off than those of multinationals. Nevertheless, volumes of sales of the multinationals were higher than those of local producers. The multinationals were able to invent hybrid corn varieties, but not the local producers. Both multinationals and local producers experienced declining trend in volumes of sales. The wholesaler-retailers incurred lower buying price and selling price than those of the retailers but got higher profits. Only a few wholesaler-retailers, who were also as distributors, progressively distributed corn seed products. In general, the corn seed market performance was not integrated at both firm-to-wholesaler and wholesaler-to-retailer levels. It indicated that the firms deliberated the traders to determine their marketing margins.

Key words: *market performance, efficiency, corn seed, hybrid, East Java*

INTRODUCTION

Background

Besides rice and soybean, corn is among the most important food crops in Indonesia. In 1980's up to the end of 1990's corn production increased rapidly. For example, corn production growth rate was 7.3 percent on average for the period of 1995-1998. On the other hand, the growth rate of rice production was -0.83 percent for the same period (CAS, 2000). Besides demand pull, fast growing of corn production was also due to technology push. Application of hybrid corn seed varieties characterized by higher yields than those of traditional ones was the main technological progress on corn practices (Simatupang, 2002).

As one of the important inputs in agricultural production, seeds play a significant role in commercial-oriented agriculture. Improved seed varieties produced by seed companies have characteristics of distinctiveness, uniformity, and stability. These seed characteristics are favored by agribusiness-oriented farmers (Sadjad, 1997).

Market opportunities, especially for hybrid corn varieties, are still promising considering that there is a wide gap between corn seed production and demand. For example, hybrid corn seed used by farmers in 1996 was only 12.4 percent of the total corn seed requirement (Sulaiman *et al.*, 1998). Currently, only about 15 percent of the total area planted to corn use hybrid corn varieties, unlike in the Philippines with 40 percent and in Thailand with 86 percent (CPAS, 2001).

Several private seed companies and one government-owned seed company produce commercial corn seeds in Indonesia. All the seed companies, either private or government-owned, have exclusive rights to produce labeled-commercial corn seeds. The government-owned company also produces hybrid and composite corn seed varieties and distributes hybrid corn seeds produced by private companies. However, it is alleged that the government-own company does not perform efficiently compared to those of private. Currently, the multinational companies dominate the domestic market of corn seed.

Objectives

The major objective of this study was to analyze the market performance of the corn seed industry in East Java Province. Specifically, the objectives of the study were:

1. to measure productive efficiency of the corn seed companies;
2. to determine pricing efficiency of the corn seed industry;
3. to assess the progressiveness of the corn seed industry;

METHODOLOGY

Conceptual Framework

The seed industry is a complex system of organizations, institutions, and individuals related with the seed program of a country. The commercial seed industry consists of individuals, seed firms, and marketing groups involved in producing and marketing seeds for sale to consumers (Douglas, 1980). In Indonesia, the commercial seed industry started to develop in 1970 when the government established a modern seed industry through Seed Project I assisted by the World Bank. This project was intended to supply high quality seed of suitable varieties to the farmers (Bastari, 1995). In 1971 the government established the National Seed Corporation, i.e., PT Sang Hyang Seri, to produce quality seeds. The seed multiplication program for paddy and other major cereals is mainly intended to increase domestic food supply, to increase the production of agricultural export products (especially estate crops), to create rural employment opportunity, to conserve natural resources and to improve land productivity. PT Sang Hyang Seri produces and distributes the extension seeds, i.e., seeds that will be planted directly by farmers.

Cromwell *et al.* (1992) classified the seed system into two sectors, namely, the formal seed sectors and the traditional seed sectors. The formal seed sector includes the various institutions involved in the multiplication, processing, and distribution of improved seeds (Walker, 1980 in Cromwell *et al.*, 1992). The formal seed system in Indonesia was initiated by the government in the late 1960's. The traditional seed sector includes systems by which farmers can get their seed requirement, retain seeds on-farm from the previous harvests, and seed exchange among farmers based on barter or social obligation. This system is common in developing countries like Indonesia. Traditional seed system exists in areas where the farmers can produce the seeds by themselves and the yields of their own seed are at acceptable levels. The study describes the commercial and formal corn seed industry in the country.

Performance of the seed industry in developing countries can be assessed through appropriateness of the seed produced in terms of variety and quality, effective operation of the agencies involved, economic benefit generated in the industry, social welfare improvement, and independent institutions involvement (Cromwell *et al.*, 1993). Clodius and Mueller (1961) define market performance as the economic results emerging from the industry as an aggregate of firms, while Sosnick (1964) explains market performance as the characteristics of production and exchange in a segment of the economy that affect the participants and society directly. According to Bain (1968), market performance is the character of end adjustments to the effective demands for their outputs which are made by sellers (or adjustments made by buyers to the effective suppliers of outputs). Bain (1968) also describes market performance

as the strategic final objectives of market adjustments employed by firms. Market performance will be assessed in terms of productive efficiency, rice efficiency, and progressiveness.

Productive efficiency evaluated in terms of turn-over rate describes ability of the producers in selling their products compared with their volumes of production. Pricing efficiency means that under a perfectly competitive market, the output price equals marginal cost (Bressler and King, 1970). The price at different markets should vary at most by the minimum cost of transfer between markets. The transfer cost may include interest, loading and unloading, and storage costs at points between markets.

Research and development activities are essential through which the firms exploit opportunities for innovation and invention. The rate of innovation is ideal if over time the firms are able to use available technological change to reduce the cost of production. However, there is no systematic criterion how to measure the potential rate of invention against the actual rate. There are four reasons why firms cannot achieve their potential rates of invention. First, misinvestment may occur in the firms because they use an objectionable test of the usefulness of investment. Second, suppression of inventions discourages the firms to invest more on inventing activities. It may occur if the consumers do not use an invention or if the patents are violated. Third, the firms may reject to issue patent licenses to competitors. This condition will make innovation spread slowly through the industry. The fourth reason is the failure to arrange for at least a full-time researcher. It appears that the firms or government agencies funding research are not responding to market demand or not creating direct use-value. The idea is that at least one person should be hired exclusively for generating ideas. In this study, progressiveness of the corn seed industry was assessed through trend in volumes of sales and technology innovations. Technology innovations pertained new corn varieties generated.

The market performance of seed industry will determine the ability of producers to sell their products, efficient pricing in the industry, progressiveness of the producers in marketing their products, and invention of improved-varieties. Thus, a good market performance is characterized by ability of the producers to achieve high turn-over rates. The price set in the industry is also efficient in which the producers and the traders get normal profits while the seed price is affordable to the farmers as the final consumers. More over, the farmers enjoy continuous high yielding varieties invented by the producers.

Data Collection

East Java Province was purposively selected as the study area because it is a major corn-growing area in Indonesia and has the biggest number of seed growers/companies and the second biggest distributors in the country (Directorate of Seed, 2002). The respondents consisted of seed distributors/

traders, corn seed companies, and the SCCS (Seed Control and Certification Service) staff at the provincial and related district levels. Complete enumeration, subject to availability and willingness, was employed in the survey of corn seed companies and traders. The study, lasting from May to June, 2002, covered 107 seed traders and 3 private seed growers, 3 seed companies (i.e., 1 government-owned and 2 private). The respondents of the corn seed traders were focused in three districts, namely Jombang, Kediri, and Nganjuk. Table 1 describes the number of the respondents in each district.

Table 1. Respondents of Wholesaler-retailers and Retailers in East Java, 2002

District	Wholesaler-Retailer (persons)	Retailer (persons)
Jombang	7	14
Kediri	14	33
Nganjuk	11	28
Total	32	75

The corn seed producers chosen as samples of the study were PT¹ BISI and its marketing company PT Tanindo Subur Prima (Kediri and Sidoarjo districts), PT Dupont Indonesia (Surabaya municipality and Malang district), PT Sang Hyang Seri (Pasuruan and Malang districts), UD² Kawan Tani (Kediri district), CV³ Tani Barokah (Malang district), and Sadar Tani (Jombang district). PT Monagro Kimia, the producer of Cargill hybrid corn seed varieties, and its marketing company PT Branita Sandhini rejected to be interviewed. All data related to both companies were gathered through corn seed distributors, the SCCS staff, and secondary information.

Primary and secondary data were used in this study. Primary data were collected both from the traders and the companies. The structured questionnaires were used to record data of the traders and the companies. The data collected were marketing costs, types of corn seed varieties, producers' volumes of production, volumes of sales of producers and traders, and monthly firm, wholesale, and retail prices. Secondary data were mainly types of corn varieties produced by the corn seed companies.

Data Analysis

Market performance of the corn seed producers was measured using Turn-over rate, productive or technical efficiency, and progressiveness. At the traders' level, measure of market performance included pricing efficiency and

¹ PT is an abbreviation of Perusahaan Terbatas (Inc. or Co. Ltd.),

² UD is an abbreviation of Usaha Dagang (Commercial Business)

³ CV is an abbreviation Commanditaire Vennootschap (Limited Partnership)

progressiveness. Spatial price efficiency was estimated to measure market integration of the corn seed industry. The followings are details of the methods of measurements.

Productive Efficiency

The study measured productive efficiency at the seed producers'/ companies' level by type of seed producer/company (private vs. government) in terms of sales turnover rate of the corn seed growers/companies which was computed as follows:

$$\text{Sales Turnover Rate (\%)} = \{(VS)/(VP)\} \times 100$$

Where:

VS = annual volume of sales

VP = annual volume of production.

Sales turnover rate indicates whether a company has overproduction or not. A sales turnover rate of less than 100 percent may indicate overproduction or limited demand for seeds. The study also examined how the firms managed overproduction in a given season.

Pricing Efficiency

Pricing efficiency was determined using marketing margins and marketing costs. Purchase and selling prices and also volumes of purchase and sale covered the period of June 2001 to May 2002.

Marketing margin. Gross marketing margin, percentage margin, percentage mark-up, and profit margin from corn seeds were computed at each level of the marketing chain (e.g., wholesaler-retailers' level and retailers' level).

Gross Marketing Margin = Selling Price – Buying Price

Percentage Mark-up (%) = $\{(Gross\ Marketing\ Margin)/(Buying\ Price)\} \times 100$

Percentage Margin (%) = $\{(Gross\ Marketing\ Margin)/(Selling\ Price)\} \times 100$

Profit Margin (per unit) = Selling Price – Marketing Cost

Profit rate. Cost and returns analysis was conducted to determine the profitability (by type of seed grower/company) of seed growing and seed trading (i.e., at wholesaler-retailers' and retailers' levels).

Return on Investment (ROI) of the seed growers and distributors by type of trader were also computed as follows:

$$\text{ROI (\%)} = \{(Net\ Profit)/(Total\ Capital\ Investment)\} \times 100$$

Capital investment was the assets owned or utilized by the corn seed traders. In this study, the assets included land, buildings (stores and ware houses), equipments (weighing scales and product-display sets), and vehicles.

Total capital investment was computed as percentages (shares) of the current market values of land, equipments, and vehicles applied for corn seed business. Besides selling corn seed, most of the traders also sold other products such as fertilizers, pesticides, and vegetable seed.

Marketing costs. Marketing costs consisted of all costs rendered in corn seed marketing. The costs include costs of supplies and corn seeds, labor cost, chemicals, packaging materials expense, transportation expense, market promotion expenses, market intelligence and research expenses, physical losses, interest on borrowed capital, depreciation of building/storage facilities, weighing scale, and other equipment, and other fees, among others.

Spatial price efficiency. To examine whether the price of corn seeds was efficient, the model of market integration was employed. The model was specified as follows:

$$(1) P_{ft} = a_0 + a_1 P_{ft-1} + a_2 (P_{wst} - P_{wst-1}) + a_3 P_{wst-1} + u_t$$

$$(2) P_{wst} = b_0 + b_1 P_{wst-1} + b_2 (P_{rt} - P_{rt-1}) + b_3 P_{rt-1} + e_t$$

where:

P_{ft} = firm price of corn seeds at time t

P_{ft-1} = firm price of corn seeds at time t-1

P_{wst} = wholesale price of corn seeds at time t (monthly or per season)

P_{wst-1} = wholesale price of corn seeds at time t-1

P_{rt} = retail price of corn seeds at time t

P_{rt-1} = retail price of corn seeds at t-1

a_0 and b_0 = intercept in equation (1) and equation (2), respectively

$a_1, a_2, a_3, b_1, b_2,$ and b_3 = regression coefficients

e_t and u_t = error terms

The coefficients, a_2 and b_2 , determine the extent to which the general economic condition affecting the reference market price level is being transmitted to the local market. If a_2 and b_2 are each equal to 1, then reference market price changes are fully transmitted to the local market in absolute terms. Index of Market Connection (IMC) is equal to a_1/a_3 and b_1/b_3 . If the index is closer to 0, then the greater the market integration would be. In the short run, the market is considered to be integrated if the index is less than 1. These models were patterned after Timmer (1974) and Heyten (1986) with some modifications. These models were also applied by Umali (1990) to test spatial price efficiency of rice in the Philippines. The corn seed varieties chosen for IMC estimation were BISI-2, C-7, and P-7 which represented among the most demanded products of PT BISI, PT Monagro Kimia, and PT Dupont Indonesia, respectively.

Progressiveness

The progressiveness of the corn seed industry at the producers' level was described in terms of technology innovations, i.e., types of corn seed varieties released, volumes of sales for the last several years, and marketing strategies of the distributors.

RESULTS AND DISCUSSION

The results of the study starts with description of Turn-over rates of the corn seed producers. The next discussion consists of pricing efficiency of the wholesaler-retailers and the retailers, market integration at the firm-to-wholesaler and the wholesaler-to-retailer levels, and progressiveness of both producers and traders.

Turn-over Rates

- (1) PT BISI. Almost 30 percent of overall market demand could be served by PT BISI. The company sold corn seeds in nearly all provinces of the country. On the average, around 30 percent of the company's annual corn seed production cannot be sold (Table 2). If the corn seed had not been treated with chemicals, it would be sold to Charoend Phokpand as feed material.
- (2) PT Dupont Indonesia (DI). Unsold corn seeds within six months since the initial labeling may be relabeled subject to the SCCS's examination. However, all unsold seed that expired after relabeling have to be destroyed. The corn seed is not fit for consumption anymore once pesticides are applied on it. In 2001, PT DI had to destroy 100 tons of unsold corn seeds through a disposal management company in Surabaya. Previously, all unsold corn seeds were burned which was much cheaper than that carried out by a disposal management company. Currently, the company was no longer allowed to burn unsold corn seeds due to possible pollution hazards.
- (3) PT Sang Hyang Seri. Unsold seed was still possible to be sold as corn grain for feed if the seed had not been treated with chemicals. However, if the seed was treated with chemicals, the seeds have to be destroyed.
- (4) UD Kawan Tani. The company had to sell the unsold corn seed at a very low price of 35 percent of the price of consumed corn. This unsold corn seed, officially, had to be destroyed because it was treated with fungicide and it would be unfit for animal and human consumption. Most probably, a local coffee processor bought the unsold corn seed as an ingredient in one of its product.

Table 2. Turn-over Rate and Productive Efficiency of Corn Seed Producer in East Java, 2002

Producer	Turn-over Rate (%)	Producer	Turn-over Rate (%)
Multinationals		Locals	
PT BISI	70	PT Sang Hyang Seri	70
PT Dupont Indonesia	50	UD Kawan Tani	90
PT Monagro Kimia	45	CV Tani Barokah	90
		Sadar Tani	80

- (5) CV Tani Barokah. Every year, around 10 percent of the corn seed production usually remained unsold due to expiration. The unsold corn seeds were destroyed because it could not be consumed anymore due to the pesticide treatment on the seed.
- (6) Sadar Tani. Unsold seeds that have not yet expired and was not treated with chemicals, would be sold for consumption. However, the price of the unsold corn seed would be much lower. In 2000, as much as 60 tons of S-3 hybrid corn seed were unsold. Usually, only 20 to 30 tons of seeds were unsold. The seeds were sold as grain for consumption at a much lower selling price.

Turnover rates of both multinational and local producers below 100 percents were due to some reasons. Firstly, demand forecasts of the producers were not accurate. The demand forecasts were based on the previous years' volumes of sales. Furthermore, the producers had to cooperate with seed growers a season earlier to produce corn seed for the next season. Secondly, the multinationals' volumes of sales relied on the government projects which reached up to 30 percent of volume of production and those of the local producers were around 90 percents. Decreased government's projects which were unpredicted previously by the producers led to dropped volumes of sales. Thirdly, the producer, for example PT Dupont Indonesia, were able to export its corn seed products. In 2001, PT Dupont Indonesia exported 5,000 tons of hybrid corn seed to Malaysia, Philippines, Japan, and Pakistan (Kompas, 2001).

Marketing Cost Analysis

Most of corn seed varieties sold either at the wholesaler-retailers' and retailers' levels were those of hybrid varieties produced by the multinationals. On the other hand, the composite corn seed varieties, i.e., Arjuna, Surya and Bisma, were less demanded by the farmers. It was also reflected by the numbers of corn seed traders by variety they sold (Tables 3 and 4).

Table 3. Number of Wholesaler-retailers Selling Corn Seed by Variety and Brand in East Java, 2002

Producer/ Brand	Trader (N=32)	Volume of Sales (Kg)	Percentage	Value of Sales (Rp)	Percentage
1. PT AAM¹⁾					
A-4	1	500	0.03	8,000,000	0.03
<i>Subtotal</i>		<i>500</i>	<i>0.03</i>	<i>8,000,000</i>	<i>0.03</i>
2. PT BISI					
BISI-2	31	326180	21.41	6,455,714,500	21.56
BISI-5	8	28870	1.89	466,947,500	1.56
CPI-2	16	53710	3.53	598,210,000	2.00
ARJUNA	12	34350	2.25	212,356,250	0.71
SURYA	7	31910	2.09	195,431,250	0.65
<i>Subtotal</i>		<i>475020</i>	<i>31.18</i>	<i>7,928,659,500</i>	<i>26.48</i>
3. PT MONAGRO KIMIA					
C-5	6	23750	1.56	434,450,000	1.45
C-7	31	257450	16.90	4,943,663,250	16.51
<i>Subtotal</i>		<i>281200</i>	<i>18.46</i>	<i>5,378,113,250</i>	<i>17.96</i>
4. PT DUPONT INDONESIA					
P-5	13	42470	2.79	958,590,000	3.20
P-7	28	201285	13.21	4,530,978,750	15.13
P-8	17	77840	5.11	1,672,047,250	5.58
P-11	27	311586	20.45	7,178,196,000	23.97
P-12	14	24024	1.58	611,080,000	2.04
P-13	15	54235	3.56	1,184,848,000	3.96
<i>Subtotal</i>		<i>389845</i>	<i>25.59</i>	<i>8,974,124,000</i>	<i>29.97</i>
5. LOCAL PRODUCERS					
BISMA	5	24350	1.60	123,464,000	0.41
<i>Subtotal</i>		<i>24350</i>	<i>1.60</i>	<i>123,464,000</i>	<i>0.41</i>
6. ILLEGAL SEED					
BISI-2	2	21050	1.38	208,400,000	0.70
Pioneer	1	10000	0.66	160,000,000	0.53
<i>Subtotal</i>		<i>31050</i>	<i>2.04</i>	<i>368,400,000</i>	<i>1.23</i>
TOTAL		1523560	100.00	29,942,376,750	100.00

Note: ¹⁾ PT Andalas Agroindo Mandiri is a domestic company based in Solok, West Sumatera the existing exchange rate was U.S. \$ 1 to Rp 9,000 the number of traders were multiple responses

Table 4. Number of Retailers Selling Corn Seed by Variety and Brand in East Java, 2002

Producer/ Brand	Trader (N=32)	Volume of Sales (Ton)	Perce- tage	Value of Sales (Rp)	Perce- tage
1. PT BISI					
BISI-2	44	89295	22.09	17,67,425,000	21.95
BISI-5	4	4650	1.15	87,850,000	1.09
CPI-2	7	2470	0.61	27,270,000	0.34
Arjuna BISI	11	13885	3.44	101,700,000	1.26
Surya	4	850	0.21	6,250,000	0.08
<i>Subtotal</i>		<i>111150</i>	<i>27.50</i>	<i>19,90,495,000</i>	<i>24.72</i>
2. PT MONAGRO KIMIA					
C-5	3	670	0.17	12,470,000	0.15
C-7	62	120250	29.75	2,283,202,500	28.35
<i>Subtotal</i>		<i>120920</i>	<i>29.92</i>	<i>2,295,672,500</i>	<i>28.51</i>
3. PT DUPONT INDONESIA					
P-5	20	6570	1.63	138,625,000	1.72
P-7	51	58214	14.40	1,322,367,500	16.42
P-8	22	25170	6.23	559,500,000	6.95
P-11	45	52299	12.94	1,158,839,000	14.39
P-12	45	8610	2.13	207,390,000	2.58
P-13	15	15915	3.94	336,970,000	4.18
<i>Subtotal</i>		<i>166778</i>	<i>41.27</i>	<i>3,723,691,500</i>	<i>46.24</i>
4. ILLEGAL SEEDS					
BISI-2	3	2600	0.64	20,800,000	0.26
BISI-5	1	500	0.12	4,000,000	0.05
Pioneer	2	2250	0.56	18,000,000	0.22
<i>Subtotal</i>		<i>5350</i>	<i>1.32</i>	<i>42,800,000</i>	<i>0.53</i>
TOTAL		404198	100.00	8,052,659,000	100.00

Note: the existing exchange rate was U.S. \$ 1 to Rp 9,000
the number of traders were multiple responses

The corn seed traders' income came from selling and the bonus (Table 5). On average, the wholesaler-retailers obtained Rp 929 million (\$ US 103,275) from selling corn seeds which was significantly higher than that earned by retailers of Rp 106 million (\$ US 11,800). Bonus acquired by the wholesaler-retailers was also much higher (Rp 26 million), than that of the retailer (Rp 0.2 million). The total bonus received by the traders depended on the volume of

sales. The higher the volume of sales, the greater is the bonus being offered to the traders by the producers. Twelve out of 35 of wholesaler-retailers implemented selling contracts with the corn seed producers while 3 out of 102 retailers engaged in selling contracts.

Table 5. Cost and Returns Analysis of Wholesaler-retailers and Retailers Engaged in Corn Seed Trading in East Java, 2002

Item	Wholesaler-Retailers (N=32)	Percentage	Retailers (N=75)	Percentage	Difference	
Gross sale						
- Corn seed selling	929,480,367	107.05	106,302,187	105.33	823,178,181	***
- Bonus	26,218,019	3.02	227,091	0.23	25,990,928	***
Total Income	955,698,386	110.07	106,529,277	105.55	849,169,108	***
Variable Cost						
- Seed purchase	860,191,891	99.07	99,804,607	98.89	760,387,283	***
- Labor	2,991,875	0.34	516,623	0.51	2,475,252	***
- Transportation	845,967	0.10	186,483	0.18	659,484	*
- Advertisement	241,406	0.03	0	0.00	241,406	
- Interest	1,278,906	0.15	85,096	0.08	1,193,810	**
- Other inputs	562,500	0.06	0	0.00	562,500	
Total variable cost	866,112,545	99.75	100,592,810	99.67	765,519,735	***
Fixed cost						
- Depreciation	2,047,456	0.24	325,590	0.32	1,721,866	***
- Rent	139,488	0.02	5,656	0.01	133,832	**
Total fixed costs	2,186,943	0.25	331,246	0.33	1,855,698	***
Total Cost	868,299,489	100.00	100,924,055	100.00	767,375,433	***
Net Profit	61,180,878	7.05	5,378,131	5.33	55,802,747	**

Note: The existing exchange rate was \$ US 1 to Rp 9,000

Figures in parentheses are percentages to total costs of each type of trader.

***, **, * are significantly different at 1 %, 5 %, and 10 % levels, respectively

The total expenditures of the corn seed traders comprised mostly of variable costs representing 99.7 percent of his expenditures. Variable costs for both types of traders were mostly on seed purchases approaching 99 percent and amounting to Rp 860 million and Rp 100 million for wholesaler-retailers and retailers, respectively. On the other hand, labor expenses of 0.3 and 0.5 percent for the wholesaler-retailers and retailers, respectively, were quite low because the traders sold other products besides corn. Thus, labor costs allocated for the corn seed business was only a fraction of the total business.

The same was true for the transportation costs because the seeds were usually delivered by the producers and distributors subject to minimum volume of purchase. Purchases of corn seeds were usually delivered along with other products.

Advertisement was only done by a few wholesaler-retailers and no retailers spent for advertisements. The multinational corn seed producers

promoted their products through strategic advertisement that reached the distributors/wholesaler-retailers, retailers and end-users. The relatively low expenses for interests indicated that traders rarely used capital borrowed from the banks. No input for seed treatment was bought by the traders because the corn seeds were treated by the producers. There was only one wholesaler-retailer who packed the illegal seeds he sold. It was common for illegal seeds to be sold without packaging and was usually wrapped in 50 kilogram sacks.

Fixed costs of both traders consisted of depreciation and rent expense. Most depreciation costs were applied for vehicles, buildings, and equipment such as weighing scales. Rent costs referred to buildings' or kiosks' rents although most traders had their own stores. Given the higher total costs of selling corn seeds, the wholesaler-retailers earned greater net profit than the retailers.

Profitability

Almost all of the marketing costs spent by the traders were for seed purchases. The wholesaler-retailers achieved higher income and higher net profits since the average buying price and selling price of wholesaler-retailers were lower than those of retailers. On the other hand, gross margins for both traders were not significantly different. The buying price of the wholesaler-retailers was on average lower (Rp 18,185/kg) than that of the retailers (Rp 18,696/kg) (Table 6). The wholesalers had lower buying prices because aside from their larger volume of purchases, they bought directly from producers and only a few from the distributors. The retailers usually bought from the wholesaler-retailers and rarely from the producers or the distributors, resulting to a higher purchase price than that of the wholesaler-retailers.

Table 6. Marketing Margin of Corn Seed Traders in East Java, 2002

Item	Wholesaler-Retailers	Retailers	Difference	
Buying price (Rp/kg)	18,185	18,696	-511	**
Selling price (Rp/kg)	19,649	19,929	-280	**
Gross margin (Rp/kg)	1,465	1,233	232	
Percentage markup (%)	8.1	6.6	1.5	
Percentage margin (%)	7.5	6.2	1.3	
Marketing cost (Rp/kg)	18,356	18,992	-636	**
Investment (Rp/trader)	184,952,094	33,392,840	151,559,254	***
ROI (%)	56.7	30.8	25.9	

Note: ***, ** are significantly different at 1 % and 5 % levels, respectively.

The existing exchange rate was U.S. \$ 1 to Rp 9,000

Investments for corn seed of wholesaler-retailers and retailers were 58.3 percents (Rp 107,902,783) and 52.3 percents (Rp 17,461,464) of overall investment, respectively.

Due to the lower purchase price of the wholesaler-retailers, they could sell corn seeds at a lower price of Rp 19,649/kg, compared to the retailers' price of Rp 19,929/kg. While the wholesaler-retailers sold corn seed to both retailers and farmers, they gave lower selling price to retailers than to farmers. The selling price of the wholesaler-retailers to farmers was relatively similar with that set by the retailers. In terms of gross profit margin, percentage mark up and percentage margin were not significantly different between both types of traders. Even though the gross margins were not significantly different between the wholesaler-retailers and the retailers, but the higher volume of sales of the wholesaler-retailers led to a higher profit.

The investments of wholesaler-retailers, amounting to Rp 185 million, was significantly higher than that of the retailers' Rp 33 million, as the consequence of greater volume of sales. In terms of return on investment, however, there was no significant difference for both groups of traders.

The gross marketing margin of the wholesaler-retailers, however, was only Rp 1,189/kg in contrast to that of the retailers which was Rp 1,336/kg. The percentage mark-up for both types of traders were comparable although that of the wholesaler-retailers was higher (6.75%) than that of the retailers (6.61%). The percentage margins followed the same pattern. However, the lower volume of sales encouraged retailers to charge higher percentage margin than the wholesalers did. The marketing margin of the wholesaler-retailers was the average value of that charged for retailers and consumers. Actually, the marketing margin of the wholesaler-retailers to the retailers was much lower than that of the retailer. The marketing margin of the wholesaler-retailers to the consumers was higher than their average marketing margin. The wholesaler-retailers usually charged the highest retail price in order to protect the retailers and to encourage them to become loyal buyers.

Multinational firms produced mainly the hybrid varieties compared to the local firms who produced the composite varieties. Average production costs of multinational companies were greater (Rp 6,200/kg) than the local firms (Rp 2,160/kg). Nevertheless, the higher selling price of Rp 19,000/kg for the hybrid varieties compared to Rp 3,400/kg set by the local firms for their products, earned for the multinational higher profits (Table 7). PT Sang Hyang Seri produced the high-yield Semar-3 hybrid corn variety at a lower production cost but it got lesser profits due to its lower selling price. The hybrid corn seed varieties sold by the multinational firms commanded a higher selling price due to its better quality particularly in terms of crop yields.

Table 7. Production Cost and Selling Price of Corn Seed Producers in East Java, 2002

Producer	Variety	Production cost (Rp/kg)	Selling price (Rp/kg)	Profit (Rp/kg)
Multinationals				
PT BISI	Hybrid ¹⁾	6,195	18,038	11,843
PT DI	Hybrid ²⁾	6,209	20,000	13,791
Average		6,202	19,019	12,817
Local firms				
PT Sang Hyang Seri	Composite ³⁾	3,044	4,500	1,456
UD Kawan Tani	Composite ³⁾	1,787	3,000	1,213
CV Tani Barokah	Composite ³⁾	1,965	3,375	1,410
Sadar Tani	Composite ³⁾	1,860	2,750	890
Average		2,164	3,406	1,242
Local firm				
PT Sang Hyang Seri	Hybrid ⁴⁾	4,392	8,000	3,608

Note: ¹⁾ BISI varieties, ²⁾ Pioneer varieties, ³⁾ Bisma variety, ⁴⁾ Semar-3 variety
 The existing exchange rate was US \$ 1 to Rp 9,000

Market Integration

The results of the regression analysis on market integration at the firm-wholesaler and the wholesaler-retailer levels are shown in Tables 8 and 9. The results showed that all indices of market co-integration, except that of BISI-2 at the firm-to-wholesaler level, were much greater than 1. The values of IMC revealed that the corn seed market was not integrated. Both coefficients of margin between current and previous wholesale price and that of current and previous retail market were equal to 1. It indicated that the price at reference market, namely the firm-wholesaler market, was fully transmitted to the wholesaler-retailer market. On the other hand, the retailers determined their own price at much higher than normal.

Table 8. Analysis Results on Market Integration at The Firm-to-wholesaler Level of Corn Seed Marketing in East Java, 2002

Variable	BISI-2	Variety C-7	P-7
Constant	-56.223	-264.856*	-19.095
F _{t-1}	0.157***	0.678***	0.990***
W _t -W _{t-1}	0.933***	1.035***	0.458***
W _{t-1}	0.842***	0.331***	0.011***
IMC	0.186	2.048	10.000
R ²	0.957	0.954	0.919
df	1041	1030	865

Note: *** Significant difference at 1 %

Table 9. Market Integration at The Wholesaler-to-retailer Level of Corn Seed Marketing in East Java, 2002

Variable	Variety		
	BISI-2	C-7	P-7
Constant	14.689	-7.282	334.251*
W_{t-1}	0.907***	0.933***	0.926***
$R_t - R_{t-1}$	0.983***	0.943***	0.800***
R_{t-1}	0.087***	0.065***	0.056***
IMC	10.425	14.354	16.604
R^2	0.974	0.988	0.951
Df	1041	1030	865

Note: ***, * are significant difference at 1 % and 10 %, respectively.

Progressiveness

In terms of corn seed production over time, the local producers showed a declining trend (Table 10). In 1998, the company produced 150 tons of Bisma corn seed but 5 tons of the production was unsold. In 1999, the company produced 70 tons of the composite corn seed variety. On the subsequent year, it produced only 25 tons but again increased to 40 tons in 2001 and 2002. For the last three years the corn seed production of CV Barokah Tani decreased to around 40 tons per year, compared with previous years when production reached 150 tons per year. Sadar Tani experienced the same production trend, namely decreasing from 200 tons per year in 1998 and 1999 to 60 tons per year in 2000. Even though its production increased to 90 tons in 2001, but it again dropped to 60 tons in 2002. The decline of the local producers' production was due to the lack of government projects for food crop production development. Almost 90 percents of the local producers' corn seed production were sold for the government's projects purposes.

Table 10. Corn Seed Production of Local Producers in East Java, 1999-2001 (tons)

Year	UD Kawan Tani	CV Tani Barokah	Sadar Tani	Total
1998	150 (30.0)	150 (30.0)	200 (40.0)	500 (100.0)
1999	70 (16.7)	150 (35.7)	200 (47.6)	420 (100.0)
2000	25 (20.0)	40 (32.0)	60 (48.0)	125 (100.0)
2001	40 (23.5)	40 (23.5)	90 (53.0)	170 (100.0)
2002	40 (28.6)	40 (28.6)	60 (42.8)	140 (100.0)

Note: Figures in parentheses are percentages (shares)

In 1999 and 2000, the production of corn seed in Indonesia was dominated by PT BISI and PT Dupont Indonesia (Tabel 11). PT BISI had a sales volume of 6,000 tons while PT Dupont Indonesia had 3,000 tons. PT Sang Hyang Seri was at the tail-end with 161 tons. The volume of sales of PT BISI dropped 4,000 tons per year on the following year until 2002. PT Dupont Indonesia maintained its sales volume of 3,000 tons in the next two years and increased to 4,000 tons in 2002. PT Sang Hyang Seri's volume of sales decreased to 150 tons in 2000 and improved to 180 tons in 2001. PT Monagro Kimia enhanced its sales volume from 500 tons in 2001 to 1,000 tons in 2002.

Table 11. Volumes of Corn Seed Sales By Seed Companies at National Level, 1999-2002

Year	PT Dupont Indonesia	PT BISI	PT Monagro Kimia	PT Sang Hyang Seri	Total
1999	3200 (34.2)	6000 (64.1)	-	161 (1.7)	9361 (100.0)
2000	3000 (42.0)	4000 (55.9)	-*)	150 (2.1)	7150 (100.0)
2001	3000 (39.1)	4000 (52.1)	500 (6.5)	180 (2.3)	7680 (100.0)
2002**)	4000 (44.4)	4000 (44.4)	1000 (11.2)	-*) -*)	9000 (100.0)

Note: *) data not available

***) up to October 2002

Figures in parentheses are percentages for the respective years

In East Java Province, the market share of PT Dupont Indonesia was 1,160 tons which shrank to 625 tons in 2002 (Table 12). PT BISI's volume of sales also declined from 750 tons to 600 tons during the same period. PT Monagro Kimia, however, was able to expand its volume of sales from 200 tons to 400 tons. In 2000, PT Monagro Kimia started marketing its C-5 and C-7 seed products but the data on volume of sales can not be precisely determined because most of the seed traders selling those corn seed, especially in the area of study, did not pay their credit to the producer.

Table 12. Volume of Corn Seed Sales by Multinational Seed Companies in East Java, 1999-2002 (tons)

Year	PT Dupont Indonesia	PT BISI	PT Monagro Kimia	Total
2001	1160 (55.0)	750 (35.5)	200 (9.5)	2110 (100.0)
2002*)	625 (38.5)	600 (36.9)	400 (24.6)	1625 (100.0)

Note: *) up to October 2002

Figures in parentheses are percentages (shares)

Unlike the local producers which never produced corn seed varieties by themselves, all of the multinational companies had their own research and development activities that made them able to release new corn varieties continuously (Subandi, 1998; Nugraha and Subandi, 2002; Appendices 1 – 4). Multinational companies did not compete only in terms of high yields for their new varieties, but also in terms of such traits as shorter harvest periods, wide adaptability to various agro-ecological environments, and resistance to pests and diseases. Multinational companies resorted to using GMOs to come up with varieties that are resistant to pest and diseases. Officially, though, the multinational companies did not admit that they sold the GMO corn seeds in Indonesia. It was possible that they are already marketed these varieties in the country and are waiting until the communities accepted GMO corn seeds.

At the traders' level, several distributors who were also wholesaler-retailers were proactive in selling their corn seed products along with other agricultural input products. Their employees, together with the sales people of the corn seed producers, visited wholesaler-retailers and retailers' stores in adjacent districts. The distributors also promoted their products through telephone calls. The wholesaler-retailers and retailers were also allowed to obtain the price list of corn seed products and provided product deliveries even if orders were made through telephone calls. It was common for the wholesaler-retailers and retailers to gather information on corn seed prices from several distributors through telephone calls before they decided to buy the products from a distributor. It was thus possible for a wholesaler-retailer or a retailer to buy from two or three distributors depending on the price discount offered.

Joint advertisements were undertaken by some distributors to attract more buyers. This was through the printing of t-shirts together with a certain corn seed producer. A bonus was given by the corn seed producers to the wholesaler-retailers or retailers who purchased certain brands. It was still profitable to the distributors for they got 5 percent, while the 2 percent was for the distributors. They give priority to selling the brands with selling contracts.

Some of the wholesaler-retailers were aggressive in selling their corn seed commodities along with other agricultural inputs they sold. They offered incentives such as seed delivery and joint promotion with the corn seed producers. They even approached government officials to supply government projects, with the corn seeds and agricultural inputs such as pesticides and fertilizers. This method was less profitable than selling directly to common buyers due to relatively higher transaction cost and the longer periods of payment.

CONCLUSIONS AND POLICY RECOMMENDATIONS

Productive efficiency of multinationals in terms of turn-over rates was relatively lower than that of local producers. However, volumes of sales of

multinationals were much higher than those of local producers. The wholesaler-retailers incurred higher total costs than those of the retailers. Nevertheless, the wholesaler-retailers achieved higher income and net profits. The average buying price and selling price of wholesaler-retailers were lower than those of retailers. On the other hand, gross margins of both traders were not significantly different. Profits earned by multinationals were much higher relatively than those received by local producers.

In general, the corn seed industry in East Java was not efficient. The corn seed market for the BISI-2 variety was integrated at the firm-to-wholesalers' level only, but it was not integrated in the wholesalers-to-retailers' level. Both C-7 and P-7 varieties were not integrated either at the firm-to-wholesaler' and the wholesaler-to-retailer' levels.

Both local and multinational producers, except PT Monagro Kimia which just directly entered the domestic market for the last three years, underwent declining volume of sales. Abilities of multinationals to generate new hybrid corn varieties continuously led to high volume of sales. On the traders' side, progressive marketing strategies were carried out by few wholesaler-retailers who also acted as the distributors.

Low turn-over rates suggest the producers to forecast demand more accurately. Relying volume of sales more on government's projects will be risky especially for the coming years when the government budget available for food crop development projects tends to diminish. The local producers need to develop their marketing strategies such as those carried out by the multinationals through open market rather than depending on captive market. Without government intervention, the corn seed industry currently dominated by the hybrid corn seed varieties was relatively profitable to the traders. However, on general the price changes at the firms' and wholesalers' levels were not transmitted fully to the wholesalers' and retailers' level, respectively. It indicated that the traders determined their percentage margins without considering the reference market.

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Appendix 1. Corn Seed Varieties Released by PT BISI, 1983-2001

No.	Variety	Year of Release	Average Yield (tons/ha)	Potential Yield (tons/ha)
1	CPI-1	1983	6.2	9.3
2	CPI-2	1992	6.2	8.5
3	BISI-1	1995	7.0	8.5
4	BISI-2	1995	8.9	13
5	BISI-3	1996	7.7	9.5
6	BISI-4	1996	8.0	11.0
7	BISI-5	1998	8.3	11.7
8	BISI-6	1998	7.7	n.a.
9	BISI-7	1998	8.3	n.a.
10	BISI-8	1998	8.0	n.a.
11	BISI-9	2001	n.a.	n.a.
12	BISI-10	2001	n.a.	n.a.
13	BISI-11	2001	n.a.	n.a.
14	BISI-12	2001	n.a.	n.a.
15	BISI-13	2001	n.a.	n.a.
16	BISI-14	2001	n.a.	n.a.
17	BISI-15	2001	n.a.	n.a.
18	Surya	1996	6.9	8.0
19	F1 BISI Sweet	2000	8.5*	n.a.
20	Super Sweet	2000	10.5*	n.a.

Note: n.a. (data not available)

*fresh stalks

Source: Nugraha and Subandi (2002)

Appendix 2. Corn Seed Varieties Released by PT Dupont Indonesia, 1985-2001

No.	Variety	Year of Release	Average Yield (tons/ha)	Potential Yield (tons/ha)
1	P-1	1985	5.6	7.0
2	P-2	1986	5.9	8.5
3	P-3	1992	6.4	9.5
4	P-4	1993	6.9	10.0
5	P-5	1993	6.8	9.5
6	P-6	1996	9.0	11.0
7	P-7	1996	8.7	10.5
8	P-8	1996	8.8	11.0
9	P-9	1996	9.0	11.0
10	P-10	1999	7.7	n.a.
11	P-11	1999	7.7	n.a.
12	P-12	1999	8.1	11.0
13	P-13	1999	8.0	n.a.
14	P-14	1999	7.6	n.a.
15	P-15	2000	8.1	n.a.
16	P-16	2001	8.1	10.5
17	P-17	2001	n.a.	n.a.
18	P-18	2001	n.a.	n.a.
19	P-19	2001	n.a.	n.a.

Note: n.a. (data not available)

Source: Nugraha and Subandi (2002)

Appendix 3. Hybrid Corn Seed Varieties Released by PT Monagro Kimia, 1983-2001

No.	Variety	Year of Release	Average Yield (tons/ha)	Potential Yield (tons/ha)
1	C-1	1983	5.8	8.5
2	C-2	1989	6.4	8.5
3	C-3	1992	6.4	8.2
4	C-4	1997	7.5	9.5
5	C-5	1997	8.0	11.5
6	C-6	1997	10.0	9.5
7	C-7	1997	8.1	11.0
8	C-8	2000	8.1	n.a.
9	C-9	2001	8.7	10.9
10	C-10	2001	8.2	n.a.

Note: n.a. (data not available)

Source: Nugraha and Subandi (2002)

Appendix 4. Hybrid and Composite Varieties Released by AARD, Universities, and Private Firms, 1969-2001

No.	Variety	Breeding Institution	Year of Release	Average Yield (tons/ha)	Potential Yield (tons/ha)
A. Hybrid					
1	Semar-1	AARD	1992	6.4	8.5
2	Semar-2	AARD	1992	6.0	8.0
3	Semar-3	AARD	1996	7.0	8.5
4	Semar-4	AARD	1999	8.5	n.a.
5	Semar-5	AARD	1999	8.5	n.a.
6	Semar-6	AARD	1999	8.9	n.a.
7	Semar-7	AARD	1999	8.5	n.a.
8	Semar-8	AARD	1999	8.5	n.a.
9	Semar-9	AARD	1999	8.5	n.a.
10	Semar-10	AARD	2001	7.7	n.a.
11	Bima-1	AARD	2001	n.a.	n.a.
12	A-4	PT AAM ¹⁾	2000	n.a.	n.a.
13	IPB-4	IPB ²⁾	1985	5.4	7.0
B. Composite					
1	BC 2	AARD	1969	3.6	n.a.
2	Harapan Baru	AARD	1978	3.6	n.a.
3	Arjuna	AARD	1980	4.3	5.8
4	Bromo	AARD	1980	3.8	n.a.
5	Parikesit	AARD	1981	3.8	n.a.
6	Sadewa	AARD	1983	3.7	n.a.
7	Nakula	AARD	1983	3.6	n.a.
8	Abimanyu	AARD	1983	3.3	n.a.
9	Kalingga	AARD	1985	5.4	n.a.
10	Wiyasa	AARD	1985	5.3	n.a.
11	Rama	AARD	1989	5.5	n.a.
12	Bayu	AARD	1991	4.0	n.a.
13	Antasena	AARD	1992	5.0	n.a.
14	Wisanggeni	AARD	1995	5.2	n.a.
15	Bisma	AARD	1995	5.7	7.3
16	Laga Ligo	AARD	1996	5.3	n.a.
17	Srikandi	Unila ³⁾	2001	6.0	n.a.

Note: n.a. (data not available),

¹⁾ PT Andalas Agroindo Mandiri, ²⁾ Bogor Agricultural University, ³⁾ University of Lampung

Sources: Subandi (1998); Nugraha and Subandi (2002)