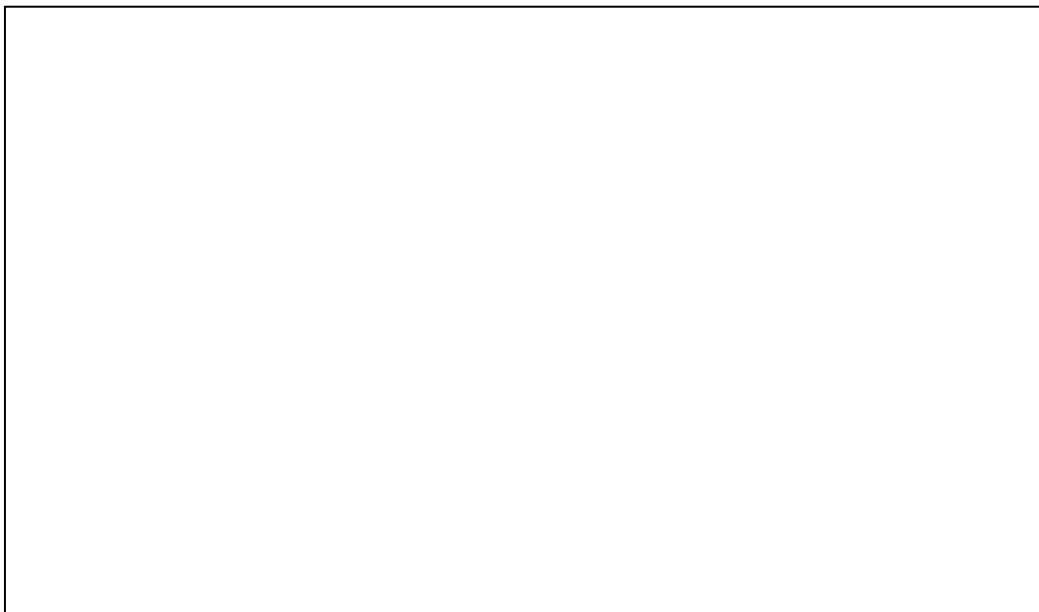


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Potato Marketing in North Sumatra and an Assessment of Indonesian Potato Trade



Witono Adiyoga, Keith O. Fuglie and Rachman Suherman



Witono Adiyoga and *Rachman Suherman* are agricultural economists at the Research Institute for Vegetables, Agency of Agricultural Research and Development, Ministry of Agriculture, located at Lembang, Indonesia. *Keith O. Fuglie* is an agricultural economist and Regional Representative for East, Southeast Asia and the Pacific (ESEAP), International Potato Center, Bogor, Indonesia.

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Abstract

Potato production and prices in Indonesia are linked to the global economy through international trade. Indonesian exports of fresh table potatoes rose steadily for more than a decade before peaking in 1995 at 103,000 tonnes, or about 10 percent of national potato production. Exports have since declined by more than two-thirds from their peak.

This paper examines trends in potato trade in Indonesia and the system of export marketing in North Sumatra. It is in small farms in this province in Indonesia where nearly all potatoes grown for the country's export market are produced. To gather data and information, the authors used a rapid market appraisal methodology, including semi-structured interviews with key informants and analysis of secondary market data. Potato marketing channels, costs and margins were also assessed.

The marketing systems appeared to be competitive and functioned with relative efficiency. Interviews with potato traders in the major import destination of Singapore revealed that Indonesian potatoes are preferred for their freshness, taste and source proximity. Declining price competitiveness was identified as the most important factor to explain the loss of Indonesia's market share in the Singapore and Malaysian potato markets in recent years. Factors contributing to the decline in competitiveness in international markets are (i) high cost of potato production, (ii) growth in domestic demand, and (iii) increased international competition. The devaluation of the Indonesian Rupiah since 1997 improved the price competitiveness of Indonesian products and slowed the downward trend in potato exports. The economic crisis in Indonesia also sharply reduced demand for potato processed products (French fries for fast food restaurants), which are supplied mainly through imports.

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Weights and measures

Rp	Indonesian Rupiah (7,300 Rp = US\$1.00 in April, 2000)
ha	1 hectare = 2.47 acres
kg	1 kilogram = 2.2 pounds
t	1 metric tonne = 1,000 kg = 2,200 pounds

INTRODUCTION

1.1 Background

Potato production in Indonesia has grown rapidly over the past several decades and Indonesia has become the largest potato producer in Southeast Asia. Between 1969-1995, potato production in Indonesia grew by an average of over 13 percent per year, more rapidly than any other country in the world. By the mid 1990s, total annual production exceeded 1 million tonnes. Most of the growth in production has come from an increase in potato planted area and secondarily from improvements in yield (Adiyoga, 1999).

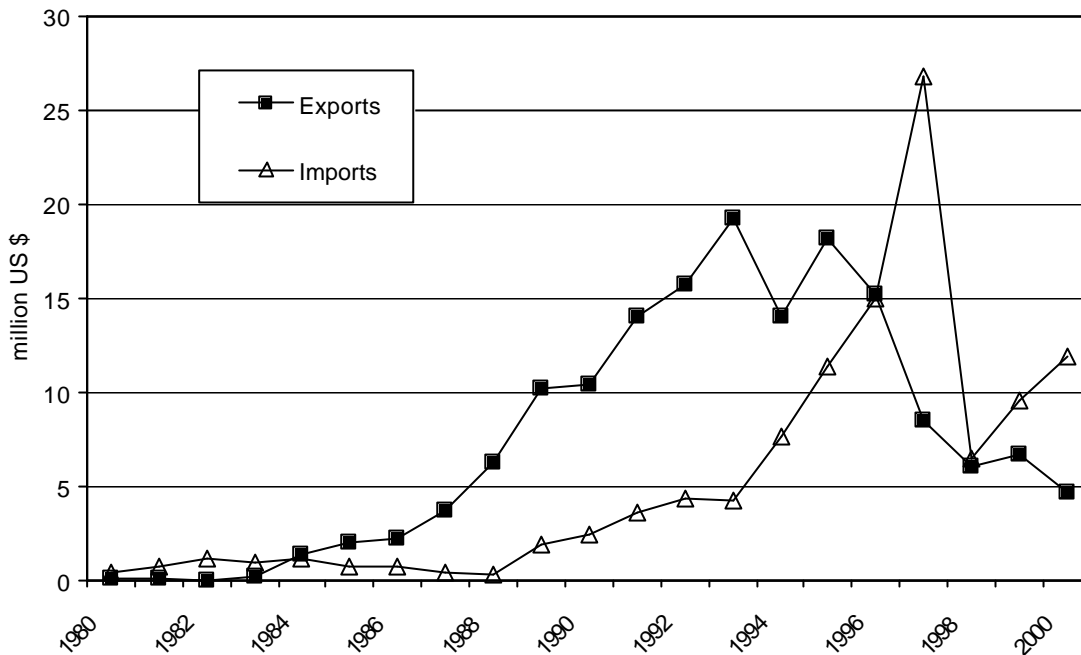
Potatoes produced in Indonesia supply not only domestic consumption but also export markets. Exports of potatoes to other Southeast Asian countries, mainly to Malaysia and Singapore, grew rapidly throughout the 1980s and early 1990s but declined after peaking in 1995 (Figure 1). Imports of potatoes, especially potato products, also grew over this period, but fell sharply after 1997. This paper examines the reasons for these changing patterns of trade in potatoes and potato products in Indonesia. Since most of the potatoes produced for export are grown in North Sumatra (Pasaribu, 1989; Ferrari, 1994), we paid particular attention to the potato marketing system in this province.

Improving potato marketing is a very important but rather neglected aspect of the potato industry in Indonesia. So far, emphasis has been placed on increasing potato production, with the goal of upgrading farm income, improving the nutritional status of consumers, and for the potato industry to act as a base for rural development (Setiadi, 1995).

There are those who hold the view that marketing is an adaptive set of activities to be given secondary consideration in potato industry development, with primary attention directed toward increasing potato production. However, markets do not develop automatically, and the lack of a well-functioning market can increase risks and costs for farmers and other market participants. There may be a need for positive action by public agencies to provide some of the basic services and create an environment conducive to efficient marketing of potato. There is also a question of whether spontaneous development of marketing firms, in the absence of facilitating policies and programs, will provide efficient and equitable linkages between producers and consumers (Hayami and Kawagoe, 1993).

The development of export markets for agricultural commodities can provide a major impetus for economic development (Myint, 1988). Export demand can provide an incentive for local producers to effect better utilization of their existing resources or bring new resources into production. However, it is said that commodity production for export sometimes produces enclave economies. But when export producers are small-scale farmers, as is largely the case with potato farmers in Indonesia, the growth in domestic resource utilization and rural income resulting from expanded trade creates backward and forward linkages which multiply the effect of exports on rural economic growth (Johnson and Kilby, 1975; Fuglie, 1991).

Figure 1. Trends in Indonesia's potato trade, 1980-2000



Source: FAOSTAT, 2001.

1.2 Objectives

Understanding the patterns of trade and constraints to export will help identify ways to improve access to profitable export markets for Indonesian potato.

Specifically, this study sought to:

- (i) describe the nature of current domestic and export potato marketing systems in North Sumatra;
- (ii) diagnose constraints to the potato export marketing system in North Sumatra;
- (iii) identify factors causing recent potato trade patterns in Indonesia; and
- (iv) identify needs and opportunities for further improving Indonesia's trade in potatoes and potato products.

METHODOLOGY

A rapid appraisal methodology (Holtzman, Lichte and Tefft, 1995) was used in the study. Two field visits to North Sumatra were made in April 2000 and January 2001 to conduct semi-structured interviews with key informants, including farmers, small traders, large traders, wholesalers, and exporters. Interview topics included (i) marketing channels, (ii) marketing margins, costs, services, and profits, and (iii) potato quality and other possible constraints to exportation.

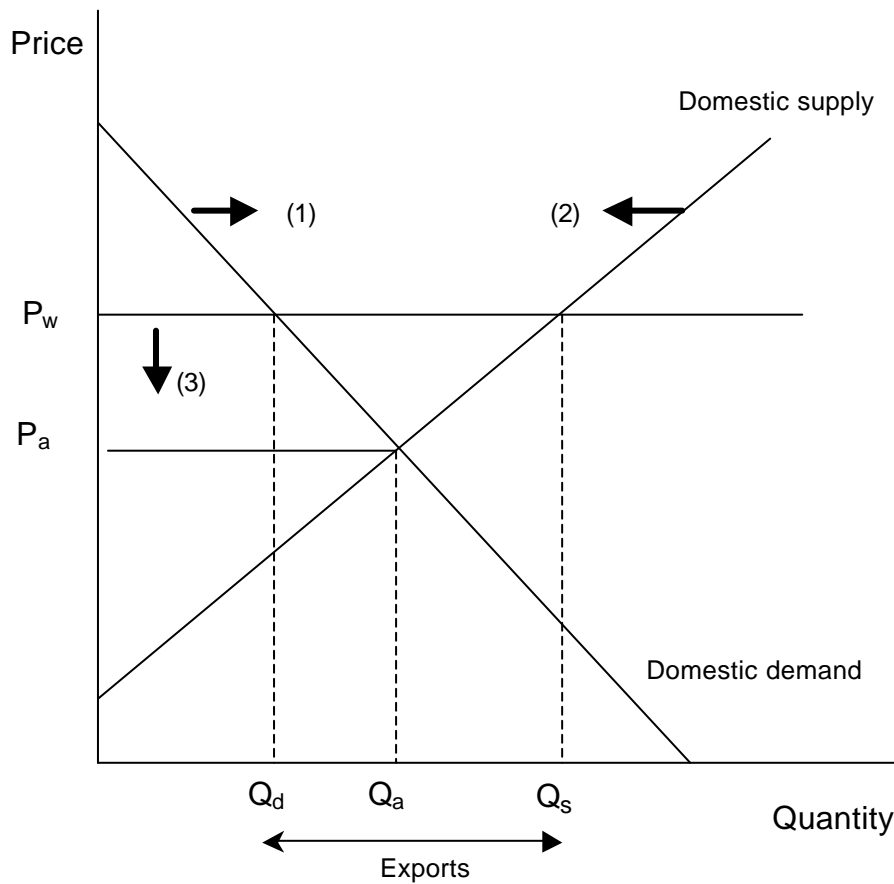
Interviews of potato importers in Singapore, a major import destination, were also conducted in November 2000 to identify constraints to importation and perceptions on the quality of Indonesian potatoes. We also interviewed food safety inspectors in Singapore to determine whether phytosanitary regulations were constraints to potato importation from Indonesia. Secondary data were collected to assess trends in potato prices at the farm, wholesale and retail levels in North Sumatra and other major potato market centers.

Several hypotheses are forwarded here to explain the changes observed in Indonesia's potato trade. Figure 2 provides a conceptual model with which to examine factors that may explain the decline in potato exports in Indonesia since 1995. If potato prices in foreign markets (P_w) are greater than the domestic autarky price P_a (the price given by the intersection of the domestic supply and demand curves) then there is an incentive to export a portion of domestic production. With exports, domestic prices will rise to the net world price P_w (i.e., the price in importing countries minus export marketing costs and other costs of international trade). The higher domestic price will cause domestic production to increase from Q_a to Q_s and domestic consumption to fall from Q_a to Q_d . The difference between Q_d and Q_s is the surplus in domestic production that is available for export. In this framework, at least three factors could cause the quantity of exports to fall:

- (1) growth in domestic demand caused by population growth, change in consumer preference for potatoes or an increase in consumer expenditures (assuming potatoes are a normal good such that per capita consumption increases with expenditures);
- (2) decline in domestic production due to increase in costs of potato production or more profitable alternative crops;
- (3) fall in the world prices (net of marketing costs) due to a decline in demand from importing countries, increase in competition from other exporters, or a decline in efficiency of the export marketing system.

This study evaluates each of these possible explanations for recent changes in Indonesia's potato trade.

Figure 2. Potato supply and demand model



In the Figure, P_w is the price received in the world market net of marketing costs. Since P_w is greater than the domestic price without trade (P_a), some production is exported. A decline in exports could be caused by

- (1) growth in domestic demand;
- (2) a decline in domestic supply (or an increase in unit production costs);
- (3) a decrease in the export price as a result of a fall in export demand, increase in global competition, or decline in marketing efficiency.

POTATO MARKETING IN NORTH SUMATRA

North Sumatra has become the second most important potato producing area in Indonesia after West Java, and accounts for about 25-30 percent of the total national potato production. In 1991-1999, the average growth of potato production in North Sumatra was 7 percent per year, mostly due to expansion in the area planted to the crop. By the late 1990s, approximately 250,900 tonnes were produced annually on about 15,900 hectares in the province.

Potato is one of the main commercial crops in the highlands of North Sumatra. Karo and Simalungun districts are the largest production centers and account for over 90 percent of all North Sumatra potato production. Potatoes, with Granola as the preferred variety, are grown mainly on small-scale farms in mixed vegetable cropping systems. The average farm size in the Karo Highlands was reported by Scholz (1983) to be 0.9 ha. Total harvested area per year was 1.6 ha giving a cropping intensity of 1.8 crops per year on average. A typical potato grower harvests about 0.1 ha of potatoes from one to two crops per year. In the five potato-producing districts of North Sumatra, yield was highest in South Tapanuli and lowest in North Tapanuli. Average yield in the province in 1995-1999 was quite stable at approximately 16 tonnes per hectare (Table 1).

Table 1. Potato area, production and yield in North Sumatra, 1995-1999

Year		Districts					Total
		Karo	Simalun- gun	Dairi	South Tapanuli	North Tapanuli	
1995	Area (ha)	11 333	4 259	263	47	731	16 633
	Prod (t)	188 548	70 950	5 064	1 076	8 228	273 866
	Yield (t/ha)	16.64	16.66	19.25	22.89	11.26	16.47
1996	Area (ha)	11 642	4 685	246	63	868	17 504
	Prod (t)	187 343	78 052	3 944	1 442	9 548	280 329
	Yield (t/ha)	16.09	16.66	16.03	22.89	11.00	16.02
1997	Area (ha)	9 280	5 948	352	44	603	16 227
	Prod (t)	139 559	99 621	5 495	1 017	6 754	252 446
	Yield (t/ha)	15.04	16.75	15.61	23.11	11.20	15.56
1998	Area (ha)	7 765	6 980	456	56	560	15 817
	Prod (t)	118 182	117 552	11 628	1 294	6 667	255 323
	Yield (t/ha)	15.22	16.84	25.50	23.11	11.91	16.14
1999	Area (ha)	6 529	5 863	373	47	513	13 325
	Prod (t)	105 916	75 104	4 179	770	6 605	192 574
	Yield (t/ha)	16.22	12.81	11.20	16.38	12.88	14.45
Average	Area (ha)	9 309.8	5 601.0	338.0	51.4	655.0	15 901.2
	Prod (t)	147 909.6	88 255.8	6 062.0	1 119.8	7 560.4	250 907.6
	Yield (t/ha)	15.84	15.94	17.52	21.68	11.65	15.73

Area is harvested area. Source: Unpublished data from the North Sumatra Agricultural Provincial Office, Medan.

3.1 Potato Marketing: A General View

Because of its geographic location, potatoes from North Sumatra can be easily marketed in the local and regional markets and also in Singapore and Malaysia. Basically, potato marketing in North Sumatra is an institutionalized service to bridge the movement of potatoes from producers to consumers. Government intervention in potato marketing is mainly limited to the availability of physical infrastructure, such as roads and market centers. Potato trade is primarily in the hands of private enterprises, although traders and exporters are required to register with government authorities for a license to market potatoes. These conditions may imply that potato marketing system in North Sumatra, like in other potato production centers, largely operates under the forces of supply and demand.

Problems that may occur in a system are usually due to: (a) producer characteristics – large scale vs. small scale, in relation to the potato volume sold, (b) crop characteristics – perishability, (c) demand patterns – seasonality, (d) marketing system complexity – inefficient flow of information, insufficient physical facilities, and low financial capacity of the market participants. For the producers, price instability may discourage crop intensification and hinder adoption of new technologies, while for the consumers; it may influence the consumption patterns and push consumers to switch to other foods.

3.2 Potato Market Structure and Prices

Certain features of a market influence the conduct of firms in a market environment. These features are usually unique to the product and institution involved. There are at least four market structure characteristics that are mutually important determinants of the type of conduct that prevails in all markets. These are: (i) the number and size of firms engaged in marketing; (ii) the nature of the product as viewed by the buyers; (iii) entry and exit conditions; and (iv) status and availability of knowledge about costs, prices and market conditions among the participants.

Marketing outlets for potatoes basically include local, regional, and export markets. Data from the North Sumatra Regional Trade Office show that 48 traders are registered as regional potato traders. These traders are responsible for bringing products to local consumers in potato-deficit districts and cities in North Sumatra of Tanjung Balai, Sidikalang, Sibolga, Medan, Pangkalan Brandan, Pematang Siantar, Binjai, and Kisaran, and to consumers in other provinces, such as Aceh, Riau, Jambi, West Sumatra, and Jakarta. In practice, however, these traders do not only market potatoes, but also cabbages, tomatoes, carrots and leafy vegetables.

Like the regional traders, the exporters do not specialize in the export of potatoes but also include important vegetables in their portfolio. The North Sumatra House of Commerce lists 37 traders who are registered as vegetable exporters. During our survey, however, we found that there were only 6 or 7 traders or firms that have routinely exported potatoes in the last 1-2 years. It should be emphasized here that the number of traders or firms in both domestic and export markets influences how the traders/firms behave.

No single trader or firm can possibly try to maximize profits without concern about other traders/firms trying to undercut their expected gains. As such, each trader or firm may strive to increase his/its share of the market and may use a number of sales tactics.

To standardize products across producers and assure homogeneity, the tubers are graded or classified according to size. In this way most buyers feel that the product of one seller is practically no different from that of another seller. A farmer will thus find it difficult to convince traders that his or her potato is any better than another farmer's potato, except when measured by obvious grade differences.

In some instances, product differentiation exists when products are processed, as in the case of some companies that grow Herta potatoes and export these as French fries material to Singapore. Product differentiation makes it possible for a firm to exercise some market monopoly power over price since it sells a differentiated product. The firm does not need to fear that an undercutting price will completely erode the market.

Before the 1990s, there were only a few traders participating in the business of potato export but when vegetable export was deregulated in 1990 (Surat Keputusan Menteri Perdagangan No. 145/KP/V/1990), new traders and firms entered the potato exporting business. In 1992, there were 46 traders and firms listed in the North Sumatra Regional Trade Office as vegetable and potato exporters. This figure, however, varies over time since traders or firms freely decide to leave the market when the potato export business is no longer profitable for them. This is because the potato market environment allows traders or firms to enter or exit the market when they want to. Factors that may influence entry and exit include absolute cost advantage and unique managerial and technical competence held by existing traders or firms.

Buyers or sellers will likely make rational decisions if they have useful and timely information at their disposal. In North Sumatra, daily wholesale price information for vegetables (including potato) is publicized through radio and information boards, especially at the rural wholesaling markets (assembly markets) in production centers. But market knowledge extends beyond information concerning prices and technical product quality. It also includes knowledge of the actions that competitors and traders or firms take, as well as reasonably informed judgments about future market conditions. Within the context of potato marketing, the existing market knowledge held by potato buyers and sellers have permitted them to make informed decisions in the market environment in which they operate

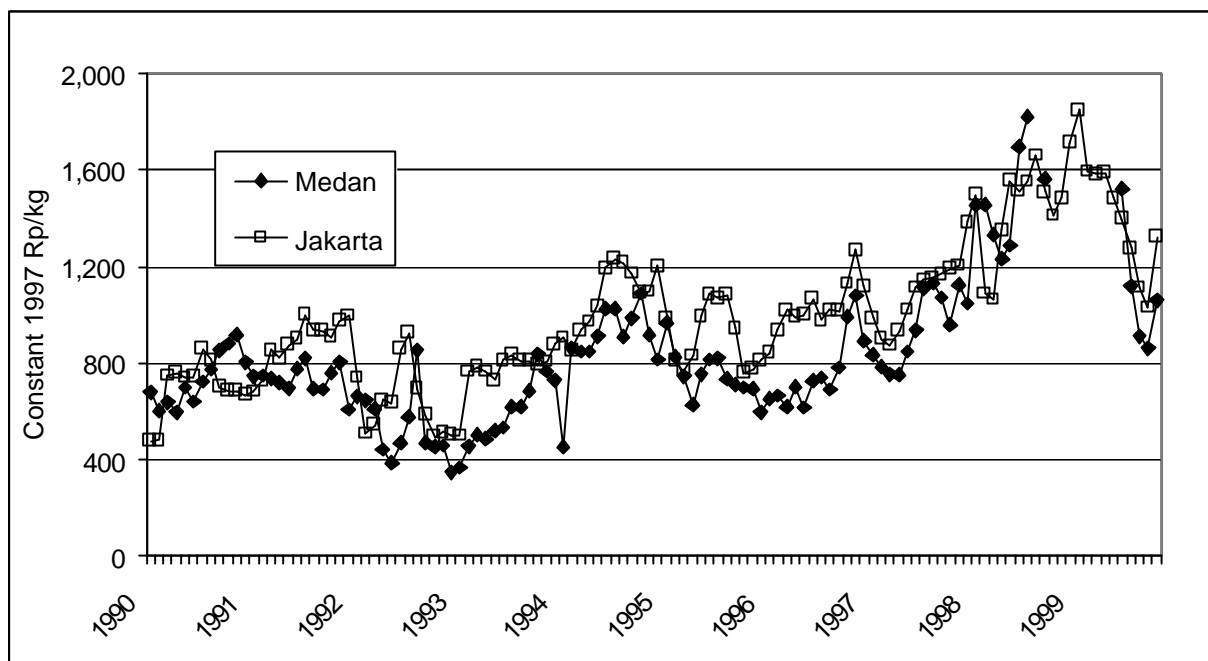
Of several characteristics listed, the two most important are the number of traders or firms and the nature of the product. Information obtained on these two characteristics indicate that the market structure for potatoes in North Sumatra could be categorized as pure competition, both on the sellers' side and buyers' side. There are a large number of registered or potential traders because of the low barriers to enter the potato trading business, and, because as earlier said, the product is relatively homogeneous.

Price fluctuation is a source of uncertainty that confronts potato growers. As negotiations and trade take place between buyers and sellers, potato prices may change from week to week, from day to day, and even within the trading day. Figure 3 shows the trends in monthly wholesale potato prices in Medan and Jakarta during 1990-1999, as well as changes in real potato prices over the period. The prices have been adjusted by the monthly Consumer Price Index (CPI), from Biro Pusat Statistik (BPS), to account for inflation.

Figure 3 also shows a significant correlation between price movements in these markets, suggesting that the markets are reasonably well integrated. Also, real potato prices followed an upward trend over much of the 1990s. Potato prices more than doubled in 1997-1998, following a large devaluation of the Indonesian Rupiah. This suggests that domestic prices are influenced by international prices

and exchange rates. Prices fell in 1999 but still remained above average for the decade.

Figure 3. Real monthly wholesale potato prices in Medan and Jakarta, 1990-1999



Source: Monthly wholesale potato prices for Medan and Jakarta are reported in Pusat Promosi dan Informasi, 1999. The monthly Consumer Price Index is the average consumer price index from 44 cities in Indonesia reported in Biro Pusat Statistik (d), various issues.

Monthly farmgate price data from 1995-1998 show that potato prices do not show any strong seasonal price pattern although they are at their lowest between January and May (Table 2). Potatoes are produced year-round in North Sumatra, with the largest volume usually harvested in the early part of the year. There is not much storage of potatoes intended for market sale because potatoes commonly reach their final market destination within 1-2 weeks after harvest. Seed potatoes, on the other hand, may be stored for several months to accommodate crop rotation and break dormancy.

Table 2. Seasonal pattern of wholesale potato prices in North Sumatra, 1995-1998

Current wholesale prices	Month											
	J	F	M	A	M	J	J	A	S	O	N	D
Monthly average price (Rp/kg)	845.6	928.8	886.0	867.6	938.4	1148.2	1278.8	1258.2	1229.4	1221.2	1208.6	1186.8
Monthly average as % of overall average ^a	78.07	85.75	81.80	80.10	86.64	106.01	118.07	116.16	113.50	112.75	111.58	109.57
Constant wholesale prices	Month											
	J	F	M	A	M	J	J	A	S	O	N	D
Monthly average price (Rp/kg)	352.9	378.4	357.2	348.6	371.4	439.5	472.7	452.5	449.2	458.7	448.4	420.1
Monthly average as % overall average ^b	85.6	91.7	86.6	84.5	90.0	106.6	114.6	109.7	108.9	111.2	108.7	101.8

^a Calculated by dividing each monthly average by the overall mean of Rp. 1083.13

^b Calculated by dividing each deflated monthly average by the overall mean of 412.47

Source: Monthly wholesale potato prices in Medan are reported in Pusat Promosi dan Informasi, 1999. The monthly Consumer Price Index is the average consumer price index from 44 cities in Indonesia reported in Biro Pusat Statistik (d), various issues.

Under competitive conditions, fluctuations in prices and marketing margins may be caused by shifts in potato supply and demand. Variability of prices and margins at different marketing levels can indicate who (producers, consumers, or traders) absorbs the cost of price instability, and therefore the relative bargaining positions of buyers and sellers. Table 3 compares the variability in monthly prices at the farm-gate, wholesale, retail levels, and marketing margins in North Sumatra in 1995-1998. These results show that the magnitude of variation in producer prices is higher than that of wholesale and consumer prices. This is consistent with a competitive market in which in the short run, the supply of the farm commodity is relatively inelastic compared with consumer demand (Tomek and Robinson, 1981).

Meanwhile, the magnitude of variation in gross marketing margin is significantly higher than that of the variation at all levels. Most of the variation in the gross marketing margin takes place between the urban wholesale and retail levels although the variation between the farmgate and wholesale marketing margin is also relatively high. Nevertheless, the variation in the farm-wholesale marketing margin is also higher than that in the farm, wholesale, and retail price levels. This comparison suggests that, in the short run, traders absorb a substantial share of the variability in potato prices. This may indicate that traders do not have a strong bargaining position to enable them to pass on the effects of shifts in supply and demand to producers and consumers.

Table 3. Potato prices and marketing margins in North Sumatra, 1995-1998

	Grand Mean	Standard Deviation	Coefficient of Variation (%)
Farmgate price (Rp/kg)	906.6 (343.8)	629.8 (131.4)	69.47 (38.22)
Wholesale price (Rp/kg)	1083.1 (412.5)	711.0 (141.7)	65.64 (34.35)
Retail price (Rp/kg)	1306.0 (497.7)	862.0 (176.4)	66.00 (35.44)
Farmers' share of retail price (%)	69.64 (69.64)	0.1191 (11.91)	17.10 (17.10)
Marketing margin (Rp/kg) (retail price – farmgate price)	399.7 (153.9)	311.7 (90.5)	77.98 (58.80)

Note: Figures in parentheses are obtained after the prices are deflated by monthly CPI.

Source: Monthly producer prices for potatoes in Brastagi, wholesale and retail prices in Medan are reported in Pusat Promosi dan Informasi, 1999. The monthly Consumer Price Index is the average consumer price index from 44 cities in Indonesia reported in Biro Pusat Statistik (d), various issues.

3.3 Potato Marketing Channels

Marketing channels facilitate the flow of potatoes from producers to consumers. A variety of well established although informal marketing channels exist in North Sumatra for the distribution and sale of potatoes in both the domestic and export markets. Aside from the growers themselves, the participants in potato marketing activities are assembly traders, commission agents, regional traders, exporters, wholesalers, and retailers. In this case, government agencies play a supportive role, such as collecting and publicizing market information, issuing licenses to traders, and generally regulating fair trading practices.

Brastagi and Medan are the two most important market centers for potato in North Sumatra. Brastagi is the principal town of the Karo highlands in the center of the main potato growing area. It serves as an important assembly point in the potato marketing system. Medan is the capital and largest city of North Sumatra with a population of around 3 million. It is an important consumer market for potato and a transshipment point for potato export through the port of Belawan and other important urban centers and ports such as Tanjung Balai.

The following are among the prominent marketing channels for both domestic and export market (also see Figure 4):

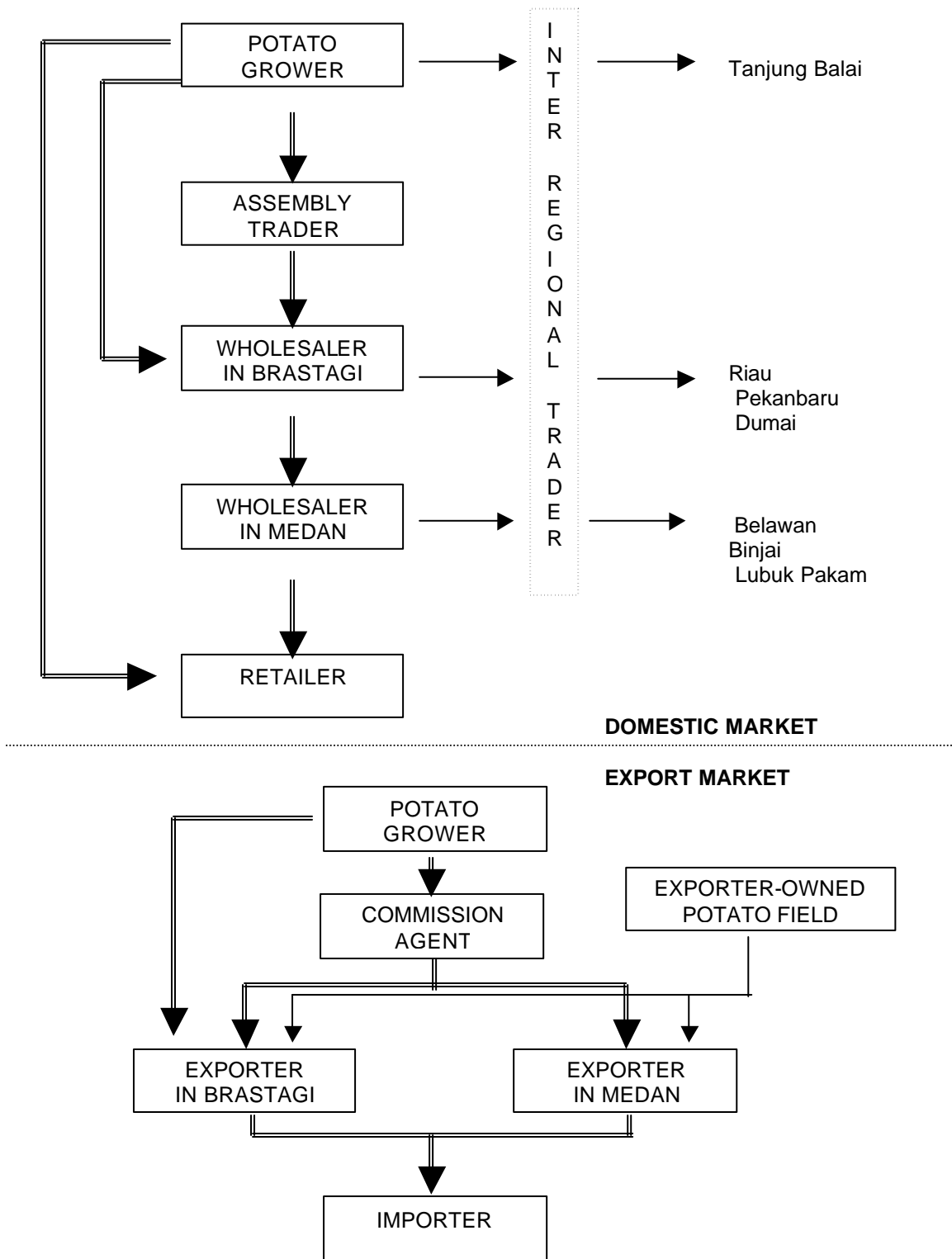
- Grower → assembly trader → rural wholesaler in Brastagi → urban wholesaler in Medan → retailer → consumer
- Grower → rural wholesaler in Brastagi → urban wholesaler in Medan → retailer → consumer
- Grower → retailer from some city markets in Medan → consumer
- Grower → regional trader → retailer in Tanjung Balai → consumer
- Grower → assembly trader → rural wholesaler in Brastagi → regional trader → wholesaler/retailer in other provincial cities of Riau, Pekanbaru, Dumai or Jakarta → consumer

- Grower → assembly trader → rural wholesaler in Brastagi → urban wholesaler in Medan → regional trader → retailer in other North Sumatra cities and towns such as Belawan, Binjai and Lubuk Pakam → consumer
- Grower → exporter in Brastagi → importer
- Grower → commissioned agent → exporter in Brastagi → importer
- Grower → commissioned agent → exporter in Medan → importer
- Exporter-owned potato field → exporter in Brastagi or in Medan → importer

The above list is not exhaustive. The following types of middlemen and their principal functions are identified from the existing marketing channels (Table 4):

1. *Assembly traders.* They may include small-scale, itinerant traders or petty field and rural assemblers, who either reside at or travel to farms or rural markets to purchase potatoes. Their activities may encompass purchase of small lots of potatoes from several growers and/or purchase of truckloads of potatoes from one or more growers at the same time; and the sale of these potatoes to wholesalers in the rural market town of Brastagi.
2. *Regional traders.* These middlemen reside outside the production centers and only go to Brastagi to buy potatoes. They bring their own or rented transportation to the field to haul potatoes that they have bought from rural assemblers or farmers. Later, they ship these potatoes to the wholesalers or retailers in other districts (e.g. Tanjung Balai) or provinces (e.g. Aceh, Riau).
3. *Commission agents.* These individuals may or may not purchase potatoes directly but instead negotiate with the producers on behalf of the buyers. They then assemble the potatoes and ship them, usually to an exporter who pays them a commission. Commission agents have a regular schedule for visiting the field and making a direct purchase from farmers, or an agreement with farmers before or after harvest for shipping their potatoes to an exporter. Some of them assemble potatoes from their own farms and have developed strong commercial ties with local growers.
4. *Rural wholesalers in Brastagi.* These are merchants residing in Brastagi who receive shipments of potatoes from growers, assembly traders, and other shippers. They sell potatoes on a wholesale basis to regional traders, and mainly to wholesalers in Medan.
5. *Urban wholesalers in Medan.* These are merchants residing at the Medan Market Center who receive potato shipments mainly from wholesalers in Brastagi. They have permanent stalls in the market center and sell their potatoes to retail merchants and secondary wholesalers in other smaller urban markets. Most of the potatoes they handle are sold on a wholesale basis.
6. *Exporters.* They receive potato shipments mainly from growers and/or commission agents. Some of them even get their potatoes from their own potato field. After procurement, potatoes are sorted, graded, packed and transported mostly to the Port of Belawan for shipment by sea to Singapore or Malaysia.
7. *Retailers.* These traders are considered as the last link in the marketing channel. They generally buy a small lot of potatoes and sell them in an unaltered form to the consumers.

Figure 4. Marketing channels for potatoes in North Sumatra



The marketing channels in which marketing agents participate are the paths the potatoes follow from their source of original production to their ultimate destination. A closer look at these marketing agents shows that there are basically five segments or channels that account for the dominant share of potato supply in terms of its absorption or distribution. From previous studies (Hutabarat, 1993; Christine, 1999) and secondary market data, we derived estimates of the proportion of potato supply absorbed by each of these five types of marketing agents (Table 4). Exporters handle the highest percentage (35.6 percent) of potato supply, specifically to the final places of destination of Singapore and Malaysia. Meanwhile, in the domestic market, it is interesting to note that there are two types of wholesalers: those who reside in the production center of Brastagi and those who operate in the urban market center of Medan. Table 5 indicates that the proportion of potato supply handled by wholesalers in Brastagi (28.2 percent) is much higher than that handled by wholesalers in Medan (8.4 percent). This may imply that wholesalers in Brastagi are mainly involved in assembling potatoes, while wholesalers in Medan are primarily engaged in distributing them.

Table 4. Functions of marketing agents in North Sumatra

Marketing Agent	Marketing Functions								
	Buying	Selling	Storing	Transporting	Sorting	Packing	Mark. Loss	Risk	Financing
Assembly trader	++	++	+	++	0	0	0	++	++
Regional trader	++	++	+	++	0	0	+	++	++
Commission agent	+	+	0	0	0	0	0	++	0
Rural Wholesaler	++	++	++	++	+	0	++	++	++
Urban Wholesaler	++	++	0	0	+	0	+	++	++
Exporter	++	++	++	++	++	++	++	++	++
Retailer	++	++	+	++	+	0	++	++	++

Note: ++ always + sometimes 0 never

Table 5. Main potato marketing channels in North Sumatra and share of supply absorbed by them

No	Marketing Agent	Percentage of Potato Supply Absorbed (%)
1.	Exporters and export commission agents	35.8
2.	Rural wholesalers in Brastagi	28.2
3.	Assembly traders	14.5
4.	Urban wholesalers in Medan	8.4
5.	Regional traders	13.1
Total		100.0

Source: Elaborated from authors' survey and previous studies (Hutabarat, 1993; Christine, 1999).

3.4 Potato Marketing Margins

Market participants are involved in many activities that add utility to potatoes and fulfill the marketing functions desired by potato consumers. These activities require costly resources, regardless of who performs them. Transaction or exchange activity also generates income for sellers. However, it should be noted that not all of these income are pure profit. In fact, a big marketing margin may result in little or no profit, or even a loss for the sellers involved. This depends not only on the marketing cost as described previously, but also on the selling and buying price. Thus, a potato marketing margin measures the share of the final potato-selling price that is captured by a particular agent in the marketing channel, and includes costs and sometimes, additional net income.

A typical wholesaler in Brastagi will generally buy about 3-5 tonnes of potatoes per day directly from farmers. Purchases are arranged by a visit to the farmers at harvest time. Potatoes are assembled, sorted by size and later shipped to wholesalers in urban centers such as the Medan Market Center. In turn, the Market Center serves retailers from markets around the Medan area, such as Mercubuana, Petisah, Peringgian, Padang Bulan, Sei Sikambing and Helvetia, and other retail markets outside Medan, such as Lubuk Pakam, Binjai and Belawan.

Retailers from these markets buy an average of about 30-400 kg of potatoes twice a week. Marketing costs are the highest at the retail level, but retailers are compensated by high profit margin (Table 6). During our survey in April 2000, the price of potatoes at the growers' level was actually quite low (Rp. 1,250 per kg), with growers indicating they only made a small profit. Some of them even experienced losses, since the cost of production was between Rp. 1,100-1,350 per kg for most farmers. Even a relatively high farmers' share of the final retail value was not a guarantee that potato growers earned profit.

As in the case of the domestic market, potato exporters mostly collect fresh potatoes from farmer's fields or from commission agents. A few of them obtain potatoes from their own fields or through contract growing. After procurement, potatoes are sorted, graded, packed in net sacks and/or carton boxes, and transported to the port, for shipment by sea to different destinations. The most common variety that is being exported is Granola, but at least one exporter we

interviewed exported mainly Herta and Diamant, for use in making potato French fries. This exporter produced these varieties on a contract basis, supplying farmers with seeds and buying back their harvest.

The main destination countries for potatoes exported from North Sumatra are Singapore and Malaysia. Some shipments have been made to Hong Kong, Japan, Brunei, Taiwan, and Myanmar, but these shipments are small and irregular. During the 1990s the volume of Indonesian potatoes exported to Malaysia was consistently 2-3 times higher than that to Singapore. Some exporters indicate, however, that the quality of potato exported to Singapore, especially in terms of size, is a little bit higher because of stringent requirements set by the country. Importers from Singapore only accept grade A (4 tubers/kg) and B (8 tubers/kg) potatoes, while importers from Malaysia also accept grade C (10-12 tubers/kg).

The main port of embarkation for potatoes exported to Singapore and Malaysia is Belawan in North Sumatra. Exporters follow standard procedures to ensure proper documentation of their shipment. Some exporters, however, claim that there is an informal channel for exporting undocumented shipment of potatoes to Singapore and Malaysia. The smaller port of Tanjung Balai is the embarkation port, where small or medium size boats await the products. Because these boats carry undocumented merchandise, they cannot dock at the port of entry and instead transfer the shipment to registered boats from Singapore and Malaysia in the high seas. The amount of potatoes sold in this manner is thought to be relatively small, at approximately 3-5 percent of total exports, although some exporters claim there is an increasing trend of using this informal channel.

The length of storage time is mainly influenced by the time needed by exporters to get the required quantity of potatoes together and to carry out post-harvest activities, such as sorting, grading and packing. Sorting and grading are usually carried out by female labor, while packing is handled by male labor. The length of storage ranges between 1 to 3 days before shipment. At the time of the survey, container and freight charges to Singapore were at US\$ 500 for a 20-foot container (approximately 12 tonnes of potatoes) and US\$ 1,100 for a 40-foot container (approximately 24 tonnes). Most exporters use a 20-foot container. The charge for freight and container is priced in US\$, hence the marketing cost and profit margin are sensitive to changes in exchange rates.

Table 7 shows that the total margin of exporting potatoes from Brastagi to Singapore is Rp 1,050 per kg. Marketing costs were dominated by expenses for transportation, especially freight and container charges. Of the potatoes purchased from farmers for export, about 3-5 percent did not meet export quality standards and were sold in the local market at a lower price.

Table 6. Marketing costs of potatoes from growers to consumers in Medan

No.	Marketing Margin	Value (Rp/kg)	Share (%)
1.	Rural wholesale level in Brastagi:		
	• Buying price from farmers	1,250.00	65.62
	• Marketing costs		2.97
	• Transportation costs to Brastagi market	27.85	
	• Sacks	2.50	
	• Cart rental fee and labor cost	7.85	
	• Marketing loss	17.50	
	• Stall rental fee	2.85	
	• Market fee	5.70	
	• Profit margin for wholesaler in Brastagi	140.75	7.39
	• Total margin at wholesale level in Brastagi	205.00	10.76
2.	Urban wholesale level in Medan:		
	• Buying price from wholesaler in Brastagi	1,455.00	
	• Marketing costs		2.32
	• Transportation costs to Medan market	35.15	
	• Unloading costs	2.00	
	• Stall rental fee	2.95	
	• Market fee	4.25	
	• Profit margin for wholesaler in Medan	130.65	6.86
	• Total margin at wholesale level in Medan	175.00	9.18
3.	Retail level in Medan:		
	• Buying price from wholesaler in Medan	1,630.00	
	• Marketing costs		4.93
	• Transportation costs	35.00	
	• Plastic bags	50.00	
	• Stall rental fee	3.50	
	• Market fee	5.50	
	• Profit margin for retailer in Medan	181.00	9.51
	• Total margin at retail level in Medan	275.00	14.44
	Total margin from grower to consumer	655.00	34.38
	Selling price to consumers	1,905.00	100.00

Table 7. Marketing costs of potatoes from growers to importers in Singapore

No.	Marketing Margin	Value (Rp/kg)	Share (%)
1.	Buying price from farmers	1,250.00	54.35
2.	Transportation from field to storage in Brastagi	20.00	0.87
3.	Sorting, bagging and weighing	40.00	1.74
4.	Marketing loss	12.50	0.54
5.	Storage	5.00	0.22
6.	Net sacks	50.00	2.17
7.	Loading to containers	10.00	0.43
8.	Transportation from Brastagi to Belawan	40.00	1.74
9.	Containers and freight, Belawan to Singapore	304.20	13.23
10.	Expedition documents	2.50	0.11
11.	Export announcement document	1.00	0.04
12.	Container freight station charge	10.00	0.43
13.	Terminal handling costs	6.50	0.28
14.	Profit margin	548.30	23.85
15.	Total margin	1,050.00	45.65
16.	Export price CIF in Singapore	2,300.00	100.00

POTATO TRADE IN INDONESIA

In the recent years, North Sumatra accounted for more than 90 percent of Indonesia's total potato exports, almost entirely in the form of table potatoes for the fresh market (Table 8). A small quantity of potato seed and processed products were recorded as exports, but these were most likely re-exports of potatoes that were previously imported. Nearly all of Indonesia's potato exports are destined for either Malaysia (about 70 percent of total exports) or Singapore (30 percent of total exports). Neither of these countries grow potatoes domestically and therefore rely on imports to satisfy local demand. The quantity of potatoes exported from Indonesia peaked in 1995 at 103,050 tonnes (Table 9). This was nearly 10 percent of total domestic production and about 40 percent of total production in North Sumatra. Exports subsequently fell to about a third of this level by the late 1990s. Between 1998 and 2000, exports were relatively stable averaging slightly over 31,000 tons/year, or about 4 percent of the domestic production.

By contrast, most potato imports were in the form of processed products. About 71 percent of the total value (US\$) of potato imports in 1994-2000 were frozen French fries, mostly originating from North America (Table 10). French fries processing requires large tubers with high dry matter, quality standards that have so far not been met by locally grown potatoes. Most of the demand for this product is met through imports, which fell sharply following the economic crisis that engulfed Indonesia in late 1997. Other processed potato products, such as starch and flakes used in food processing, accounted for another 15 percent of the value of potato imports during this period. Most of these imports came from European countries.

Seed potatoes are the third most important category of imports, accounting for 9.4 percent of quantity and 7.1 percent of the value of total potato imports during 1994-2000. The Netherlands is the most important source of seed potatoes. The growth in potato imports between 1998 and 1999 is accounted almost entirely by a rapid growth in seed imports, which rose from 360 tonnes in 1998 to 6,120 tonnes in 1999. The rapid rise in potato prices between 1998 and 1999 (see Figure 5) caused Indonesian farmers to increase area planted to potatoes and thus increased the demand for potato seed. Table potatoes accounted for only a small part of total imports.

This shows that there are in fact two distinct "markets" for potato in Indonesia. The first market is for fresh table potatoes, the demand for which is met mainly through domestic production, with some surplus also exported to nearby countries. The second market is for processed potato products. Demand for processed potato products is met primarily through imports. Most locally grown potato varieties (e.g., Granola) do not have the appropriate quality characteristics for use in potato processing, but are adequate for the fresh market. However, because potatoes are bulky and mostly (80 percent) composed of water, inter-continental trade in fresh table potatoes is often not economical. Because of value-added and bulk reduction through processing, however, inter-continental trade in processed potato products in many cases is economical.

Table 8. Potato exports from North Sumatra, 1990-1999

Year	Export volume (t)	Export value ('000 US\$)	Export FOB price (US\$/t)	Share of North Sumatra production for export	North Sumatra's share of total Indonesian potato exports
1990	69,853	7,775	111	80%	91%
1991	96,986	10,877	112	103%	99 %
1992	97,883	15,462	158	71%	100 %
1993	121,792	18,437	151	98%	96 %
1994	81,072	12,399	153	36%	91 %
1995	87,247	19,650	225	38%	85 %
1996	61,140	12,380	202	23%	77 %
1997	36,595	8,399	230	17%	100 %
1998	30,859	5,769	187	12%	99 %
1999	18,568	3,584	193	10%	56%

Source: Unpublished data from the North Sumatra Agricultural Provincial Office, Medan.

Table 9. Composition of Indonesian potato imports, 1994-2000

Quantity (1000 t)					
Year	Total	Table	Seed	Frozen	Other Processed
1994	9.86	0.33	0.87	6.58	2.08
1995	13.40	0.31	0.78	9.72	2.59
1996	17.22	0.89	1.21	11.83	3.29
1997	27.63	2.04	0.90	23.06	1.63
1998	9.71	0.68	0.36	6.92	1.74
1999	24.14	3.18	6.12	6.48	8.36
2000	19.82	4.57	1.26	10.41	3.59
Average	17.40	1.71	1.64	10.71	3.33
% of total	100.0%	9.9%	9.4%	61.6%	19.1%
Value (million US\$)					
Year	Total	Table	Seed	Frozen	Other Processed
1994	6.45	0.16	0.87	4.20	1.21
1995	12.08	0.42	0.82	8.80	2.04
1996	16.62	0.44	0.99	11.72	3.47
1997	26.87	1.50	0.86	22.96	1.54
1998	6.48	0.34	0.26	4.78	1.10
1999	9.59	0.96	1.94	4.21	2.48
2000	11.89	1.44	0.68	7.69	2.09
Average	12.85	0.75	0.92	9.19	1.99
% of total	100.0%	5.9%	7.1%	71.5%	15.5%
Price (US\$/t)					
Year	Total	Table	Seed	Frozen	Other Processed
1994	654	494	1,008	639	580
1995	901	1,363	1,040	905	787
1996	965	491	817	991	1,055
1997	972	739	959	995	943
1998	667	502	728	690	628
1999	397	301	317	649	297
2000	600	314	538	739	582
Average	737	601	772	801	696

Source: Biro Pusat Statistik (b), various annual issues. Imports include:

SITC Codes 5410100 potatoes, seed
5410900 potatoes, fresh other than seed (table potatoes)
5469100 potatoes, frozen
5661100 potatoes, frozen, airtight container
5661900 potatoes, frozen, other container
5676100 potatoes, not frozen, airtight container
5676900 potatoes, not frozen, other container
5611000 potatoes, flakes
59213110 potato starch, for baking, packs ≥ 30 kg
59211390 potato starch, for baking, other packs
59213990 potato starch, other
59213000 potato starch

Table 10. Composition of Indonesian potato exports, 1994-2000

Quantity (1000 t)					
Year	Total	Table	Seed	Frozen	Other Processed
1994	89.12	88.92	0.04	0.15	0.00
1995	103.05	102.94	0.03	0.08	0.00
1996	79.75	79.68	0.00	0.07	0.00
1997	36.76	36.76	0.00	0.00	0.00
1998	31.25	31.20	0.02	0.02	0.01
1999	33.26	32.27	0.13	0.84	0.02
2000	30.68	30.23	0.09	0.28	0.08
Average	57.70	57.43	0.04	0.21	0.02
% of total	100.0%	99.5%	0.1%	0.4%	0.0%
Value (million US\$)					
Year	Total	Table	Seed	Frozen	Other Processed
1994	14.08	13.88	0.01	0.19	0.00
1995	18.22	18.12	0.01	0.09	0.00
1996	15.09	15.02	0.00	0.07	0.00
1997	8.43	8.43	0.00	0.00	0.00
1998	5.96	5.89	0.00	0.08	0.00
1999	6.72	5.80	0.09	0.83	0.00
2000	4.62	4.46	0.03	0.09	0.04
Average	10.45	10.23	0.02	0.19	0.01
% of total	100.0%	97.9%	0.2%	1.8%	0.1%
Price (US\$/t)					
Year	Total	Table	Seed	Frozen	Other Processed
1994	158	156	173	1,243	
1995	177	176	407	1,129	
1996	189	188	2,046	987	
1997	229	229	531	5,000	
1998	191	189	44	3,154	248
1999	202	180	646	991	107
2000	151	148	383	319	480
Average	185	181	604	1,832	278

Source: Biro Pusat Statistik (a), various annual issues. Exports include:

SITC Code 5410100 potatoes, seed
5410900 potatoes, fresh other than seed (table potatoes)
5469100 potatoes, frozen
5611000 potatoes, sliced

We also assessed potato trade from the perspective of importers by collecting secondary data from import markets and interviewing potato traders in Singapore. Official trade statistics in Singapore and Malaysia record imports from each country but due to a long-standing agreement do not record imports from Indonesia. Since Indonesia has been the largest single exporter of potatoes to these countries,

Singapore and Malaysian trade statistics significantly under-report total potato imports. We adjusted the official estimates of potato imports by Singapore and Malaysia by including the quantity of potatoes exported to these countries from Indonesia reported in Indonesian trade statistics yearbooks. These estimates are reported in

Table 11.

In the 1990s, total demand for table potatoes in Malaysia and Singapore ranged between 150,000 and 200,000 tonnes per year. Indonesia's share in these markets declined from more than 50 percent in the early 1990's to around 20 percent by the end of the decade (

Table 11). The loss of Indonesia's market share in Singapore and Malaysia was accompanied by a growth in exports to these countries by China and Europe, especially the Netherlands. Australia and New Zealand are also major suppliers of potatoes to these markets. A devaluation of the Chinese currency in the mid-1990s helped make Chinese exports more competitive. However, the devaluation of the Indonesian Rupiah since late 1997 helped Indonesian potato exporters improve their price competitiveness.

In our discussions with potato importers in Singapore, they acknowledged several advantages of obtaining potatoes from Indonesia:

- it is close by and quick delivery is possible at low transportation costs;
- potatoes are available year-round; and
- are fresh and good for curries because they do not crumble.

Disadvantages mentioned were that potatoes from Indonesia are:

- generally small in size, while highest demand is for the large-size grade;
- sometimes, they are not properly cleaned and are packaged poorly; and
- sometimes, the potatoes have worms (potato tuber moth) or diseases and may rot after several days (although rotting is generally not a problem because potatoes are not stored but moved immediately into retail markets).

According to importers, price remains the most important factor in determining where they source their potatoes. In recent years, Chinese and Dutch exporters have been able to offer potatoes at lower prices than Indonesian exporters. This has been the principal reason for the loss of market share by Indonesia, according to the Singapore traders who were interviewed. Indonesia's competitive advantage lies in its ability to produce a year-round supply, while exporters in temperate countries only offer seasonal supply. Countries in northern latitudes, for example, supply mainly from October to March, while countries in southern latitudes export potatoes mainly between April to September. Indonesia's proximity to Singapore and Malaysia is also a major advantage because it enables exporters to respond quickly to new orders and the transportation cost is lower. An order from Indonesia, for example, can arrive in Singapore in only 2 days, while delivery takes 8-10 days from China and up to three weeks from Europe.

We also inquired whether pesticide residue on imported potatoes was a problem in the Singapore market. Singapore enforces strict pesticide residue limits on fresh fruits and vegetables, and shipments that do not meet standards are rejected. Regulators sample shipments at random and test results are reported the same day. If repeated violations of pesticide limits are observed in fresh produce originating from a certain country or province, a warning or temporary ban on shipments from that region may be imposed. Most problems with pesticide residues occur in leafy vegetables because pesticides are applied directly to the food portions of the plant. For a rootcrop like potatoes, however, pesticide residue has not been a problem and there have been no instances of potato shipments from Indonesia being rejected for pesticide residues at least in recent years (Yeo, 2000).

Why have Indonesian potato exports declined? We can rule out the possibility that the decline is due to a reduction in domestic supply. On the contrary, potato production in Indonesia in general, and North Sumatra in particular, has expanded rapidly over the past two decades and shows little evidence of decline in recent years. Further, the decline in exports does not appear to be due to

inefficiencies in the marketing system. There has probably been an increase in competition among exporters, and barriers to entry into potato marketing remain relatively low. The most likely explanations for the decline in exports are 1) increased domestic demand that consequently reduced export volume, and 2) increased global competition.

At least until the economic crisis that began in 1997 growth of domestic potato demand was most likely the most significant reason for the decline in Indonesia's potato exports. In a separate paper (Fuglie, Adiyoga, and Suherman, 2001), we examined the demand for both table potatoes and processed potato products in Southeast Asian countries. Demand for potatoes in these countries is strongly influenced by population, consumer income and the rate of urbanization. Between 1971 and 1998, average per capita consumption of table potatoes in Indonesia increased from 0.9 to 4.1 kg/year, a four-fold increase. In fact, exporters interviewed in North Sumatra did not express concern or alarm over the decline in potato exports. The loss in potato export business was made up by gains in other markets.

Increased global competition has also contributed to loss of Indonesia's potato export market share. In the 1990s, China emerged as a major new competitor in Southeast Asian potato markets. In 1999, Indonesia, China, Australia/New Zealand, and Europe had roughly equal market shares, with about 25 percent each, in the Singapore potato market. There has been no downward trend in potato import prices in Singapore over the decade (Figure 5). This factor has probably been relatively more important than growth in domestic demand in the late 1990s, and may explain why Indonesia potato exports did not recover even after the sharp devaluation of the Rupiah in 1997.

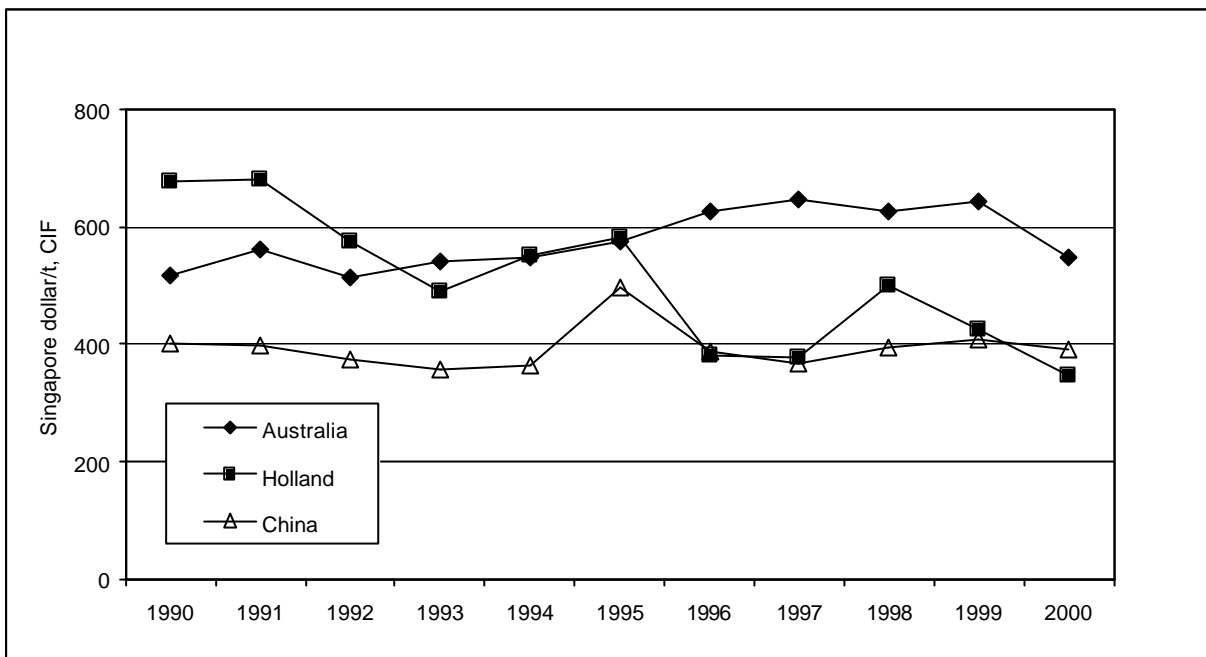
These findings have implications for future directions of Indonesian potato trade. In the 1980s and 1990s, Indonesian farmers responded to the rapidly growing urban demand for food products in foreign and domestic markets. In the highlands of Indonesia, small-scale farmers found it more profitable to expand high-value horticultural production compared to their traditional export commodities like tea and coffee. Interestingly, farms in the Cameron highlands of Malaysia, which are also suitable for potato growing, are not planted to potatoes. Instead, farmers in these highlands specialize in more perishable horticultural commodities such as leafy vegetables and flowers, while Indonesian farmers concentrate on exporting vegetables such as potatoes and cabbages that have longer shelf life. In the late 1990s increased domestic demand and increased global competition reduced the volume of potato exports from Indonesia.

Table 11. Indonesia's market share of potato importation by Singapore and Malaysia, 1990-1999

Year	Malaysia			Singapore		
	Total potato imports (tons)	Imports from Indonesia (tons)	Indonesia's market share	Total potato imports (tons)	Imports from Indonesia (tons)	Indonesia's market share
1990	115,327	53,143	0.46	38,655	23,286	0.60
1991	138,432	76,493	0.55	37,497	21,113	0.56
1992	139,277	73,115	0.52	36,139	23,222	0.64
1993	179,996	105,742	0.59	41,143	20,818	0.51
1994	147,453	73,259	0.50	42,778	15,433	0.36
1995	158,803	79,411	0.50	44,327	23,466	0.53
1996	136,159	55,777	0.41	38,746	15,018	0.39
1997	105,162	21,162	0.20	44,243	15,511	0.35
1998	109,963	21,843	0.20	33,024	5,887	0.18
1999	117,373	20,583	0.18	44,502	11,391	0.26

Source: Potato imports by Malaysia and Singapore from countries other than Indonesia are from FAOSTAT, 2001. However, these totals do not include imports from Indonesia. Imports from Indonesia are from Biro Pusat Statistik (a), various annual issues. Total imports are found by adding FOASTAT and Indonesia totals.

Figure 5. Potato import prices in Singapore by country of origin, 1990-2000



Source: Singapore Trade and Development Board, various annual issues.

CONCLUSIONS AND RECOMMENDATIONS

Some of the main conclusions from our study are:

- Indonesia's potato markets are increasingly integrated with regional and global potato markets. Indonesian potato exporters face competition from Europe, China, and Australia/New Zealand in regional trade of fresh table potatoes. Potato prices faced by Indonesian farmers are influenced by global supply and demand conditions and currency exchange rates.
- The principal reasons for the decline in potato exports from Indonesia in 1995-1998 were rapid growth in domestic demand and increased competition from other exporters, especially China and the Netherlands. The fall in consumer purchasing power and the devaluation of the Rupiah as a result of the current economic crisis in Indonesia reduced domestic demand for potatoes and improved Indonesia's export competitiveness.
- Indonesia is a relatively high cost producer of potatoes but enjoys some advantages in Southeast Asian markets due to market proximity. These include lower transportation costs, timely deliver, and freshness of product. Indonesia also has an advantage of being able to provide year-round supply.
- Based on the existing number of potato traders and exporters in North Sumatra, low barriers to entry, and the homogeneous nature of the locally grown potatoes, the market structure for potatoes in North Sumatra can be categorized as competitive. Changes in government licensing policy reduced barriers to entry and increased competition among traders and exporters. Marketing costs and profits do not appear to be excessive, and product losses during marketing appear to be low.
- There are five main segments or marketing channels for potato supply in terms of its absorption or distribution in North Sumatra. Exporters and their commission agents handle the highest percentage (35.8 percent) of potato supply, for export mainly to Singapore and Malaysia.
- Potato price variability in North Sumatra is higher at the farmgate level than at the wholesale and retail levels. Meanwhile, the variation in gross marketing margin is higher than that of potato prices at the farm, wholesale, and retail levels. Thus, traders face as much or more uncertainty in profit margins as farmers. This indicates that traders behave as price-takers and do not have much power to establish prices in their favor.
- In the local market in North Sumatra, marketing costs are highest at the retail level, but retailers also earn the highest profit margin. Interviews revealed that a relatively high farmers' share of the marketing margin does not guarantee potato growers will earn profits. This may imply that when the price is low, the risk of experiencing the loss is seemingly much higher for potato growers than potato traders.
- In the export market, total marketing margin for potatoes is quite high at approximately 45 percent of the selling price to importers. Out of this, 24 percent is profit margin and 21 percent represents marketing costs. The

biggest expenses in marketing costs are charges for freight and shipping containers. Since charges for freight and container are in US\$, marketing margin is sensitive to changes in exchange rates.

- Although pesticide use on potatoes is relatively high in Indonesia, the issue of excessive pesticide residue has so far not been a constraint to exporting potatoes. No shipments from Indonesia have been rejected for this reason.
- In Indonesia, there are essentially two separate markets for potatoes: fresh table potatoes supplied from local production and processed potato products supplied mainly through imports. Frozen French fries are the most important imported potato product. With the Indonesian economic crisis, the demand for imported French fries declined sharply.
- Granola is the dominant potato variety grown in North Sumatra, with an average yield of approximately 16 tonnes per hectare. In 1991-1998, the average growth of potato production in the province was 14.9 percent per year. The growth of potato-harvested area and yield contributed 8.7 percent and 6.2 percent to the production growth, respectively. Growth in potato production declined in the latter part of the decade.
- The possibility of year-round production means that the average duration of potato storage for table potatoes is short (1-2 weeks) and seasonal prices are relatively stable. Prices are somewhat below the annual average during the main harvest season between January and April.

Our principal recommendations for policy-makers are:

- An important long-term strategy for improving Indonesia's export competitiveness in potatoes is to reduce the cost of production through the development and diffusion of improved technology to farmers. Improved varieties for table use and for processing, better quality seed and more effective, economical and environmentally safe methods of pest and disease control are especially needed.
- Gains in marketing efficiency can be achieved through improved market information services and marketing infrastructure. Timely market information on domestic and international potato prices and trading opportunities can reduce the transaction costs of potato marketing. Better information on desired quality attributes by consumers in domestic and foreign markets can help local producers meet market demand. Desired results could also be achieved by establishing export-oriented producer groups and export terminals. These will guide and control export through the use of quality control and good post-harvest practices. Forward contracting between producer groups and trading firms can help reduce price risk faced by farmers.

References

Adiyoga, Witono, R. Suherman, A. Asgar, and Irfansyah. 1999. "Potatoes in West Java: A rapid appraisal of production, marketing, processing, and consumer preferences." International Potato Center, Lima, Peru.

- Adiyoga, Witono. 1999. Pola pertumbuhan produksi beberapa jenis sayuran di Indonesia. Jurnal Hortikultura 9(3).
- Adiyoga, Witono. 2000. Perkembangan ekspor-impor dan sumber ketidak-stabilan penerimaan ekspor komoditas sayuran di Indonesia. Jurnal Hortikultura 10(1).
- Adiyoga, Witono, Keith O. Fuglie, and Rachman Suherman. 2001. "Market integration for Potatoes in Indonesia: Correlation and Cointegration Analysis," Mimeo. Research Institute for Vegetables (RIV), Lembang, Indonesia.
- Biro Pusat Statistik (a). Various annual issues. Exports. Jakarta, Indonesia.
- Biro Pusat Statistik (b). Various annual issues. Imports. Jakarta, Indonesia.
- Biro Pusat Statistik (c). Various annual issues. Statistik Indonesia. Jakarta, Indonesia.
- Biro Pusat Statistik (d). Various issues. Buletin Ringkas BPS. Jakarta, Indonesia.
- Christine, M. 1999. Analisis pemasaran kentang: Studi kasus Kecamatan Simpang Empat, Kabupaten Karo, Propinsi Sumatera Utara. Skripsi Jurusan Sosial Ekonomi Pertanian, Fakultas Pertanian, Universitas Sumatera Utara.
- Ferrari, Maria F. 1994. "20 Years of Horticulture in Indonesia: The Vegetable Subsector," Working Paper 15, CGPRT Centre, Bogor, Indonesia, September.
- Fuglie, K. (1991). "Vent-for-Surplus as a Source of Agricultural Growth in Northeast Thailand, 1958-1980," Journal of Developing Areas 25, 3 (April): 331-346.
- Fuglie, Keith O., W. Adiyoga, and R. Suherman. 2001. "The Irish Potato in Southeast Asia's Ricebowl," Mimeo. International Potato Center (CIP), Bogor, Indonesia.
- FAOSTAT. 2001. Agricultural Databases. Food and Agricultural Organization, Rome. Data downloaded from internet web address at <http://apps.fao.org/page/collections?subset=agriculture> , March 1.
- Harmon, H. 1994. The Singapore market for fresh fruits and vegetables. Survey Report. USAID - Agribusiness Development Project. Jakarta.
- Hayami, Yujiro and T. Kawagoe. The Agrarian Origins of Commerce and Industry: A Study of Peasant Marketing in Indonesia. London: Macmillan, 1993.
- Holtzman, John S. John A. Lichte, and Jane F. Tefft. 1995. "Using Rapid Appraisal to Examine Coarse Grain Processing and Utilization in Mali, in Prices, Products, and People: Analyzing Agricultural Markets in Developing Countries (G.J. Scott, ed.). Boulder, CO: Lynne Rienner Publishers.
- Hutabarat, B. 1993. Analisis pasar komoditas sayuran Tanah Karo: Kasus kentang dan bawang daun. Forum Penelitian Agro Ekonomi 11(2).
- Johnson, Bruce F. and Peter Kilby. 1975. Agriculture and Structural Transformation: Economic Strategies in Late-Developing Countries. New York: Oxford University Press.
- Myint, H. 1988. Export and economic development of less developed countries. In Agricultural Development in the Third World (C.K. Eicher and J.M. Staatz, eds). Baltimore, MD: Johns Hopkins University Press.
- Pasaribu, Sahat M. 1989. "North Sumatra: Export-Based Potato Production." In Potato in Indonesia: Prospects for Medium Altitude Production (J.W.T. Bottema et al., eds). CGPRT Center No. 21, Bogor, Indonesia, pp. 99-101.

- Pusat Promosi dan Informasi Tanaman Pangan dan Hortikultura. 1999. Vademekum Pemasaran 1990-1999. Ministry of Agriculture, Jakarta, Indonesia.
- Setiadi, T. 1995. Peluang pasar kentang di Indonesia. Makalah disampaikan pada Seminar Agribisnis Kentang. Agribusiness Club, Jakarta 18-19.
- Scholz, Ulrich. 1983. The Natural Regions of Sumatra and Their Agricultural Production Pattern: A Regional Analysis, Volume 1. Central Research Institute for Food Crops, Ministry of Agriculture, Bogor, Indonesia.
- Singapore Trade and Development Board. Various annual issues. Singapore Exports and Imports. Singapore.
- Tomek, William G. and Kenneth L. Robinson. 1981. Agricultural Product Prices, 2nd edition. Ithaca, NY: Cornell University Press.
- Yeo, Astrid. 2000. Personal interview. Director of the Fruit and Vegetable Inspection Section, Agri-food and Veterinary Authority of Singapore, November.

APPENDIX Map of Indonesia showing location of North Sumatra

