Regoverning Markets

Small-scale producers in modern agrifood markets

Agrifood Sector Studies

Restructuring of agrifood chains in Indonesia: National and local meso study report (A)

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Regoverning Markets

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Table of contents

1 Summary

The retail and processing 'symbiosis' is a key part of food market restructuring in Indonesia. The rapid growth of the supermarket sector was triggered by the removal of the Foreign Direct Investment (FDI) restriction in 1998 and complemented by the growth of the urban population and investment in property. The fresh fruit and vegetable sales (FFV) share in supermarket sales increase very rapidly in a short time, and a very high proportion of those fresh fruit and vegetable sales are of imported produce − at least double to triple the imports share in supermarket fresh fruit and vegetable sales in comparable developing countries.

The leading supermarket chains have moved very early on to the use of supply channels other than the traditional wholesale markets. They increasingly source local vegetables via new-generation specialized wholesalers dedicated to the modern market and grower/packer/shippers using outgrower schemes. The reason behind this early move by the supermarket sector to new commercial agents outside the traditional wholesale markets was the poor quality and efficiency of the main wholesale market system.

Food industry development has also been very consistent with the retail market restructuring. In 1995, food stuffs − whether fresh or processed − were nearly all sold via small shops and wet markets. By 2005 most of processed foods were being sold via modern retail outlets. While supermarkets went from approximately 5 – 30 percent of food retail sales overall from 1995 to 2005 (as was usual in all countries), the penetration was much quicker in processed foods and much slower in fresh foods. The share of fresh fruit and vegetables sold via modern retail outlets is low, less than 10 percent. Hence the effect of market restructuring is expected to be via a chain process of retail, affecting processing which in turn affects farmers, rather than the (expected slight) effect of retail directly on farmers.

Potatoes are a major crop in Indonesia; they are ranked second in vegetable production and in the top five vegetables sold in supermarkets and wet markets. Indonesia does not import fresh potatoes for consumption but does import some seed potatoes. Demand for potatoes has been rapidly increased by the change in consumption channelled by the demand of modern retail outlets, the Americanization of chain restaurants, and the demand of the food industry for raw materials for processing. Domestic potato production has been constrained by limited certified seed potato availability and, more significantly, by an import restriction on seed potatoes import that has been in place since 2004. From the beginning of the demand surge, total potato imports increased eight-fold in a decade (1994 to 2005), especially for potato starch, and frozen and processed/preserved potatoes.

Diet change in Indonesia is a key part of the restructuring story. The first stage of this diet change was the great increase in potato consumption in the 1970s and 1980s. After that, the share of consumption via the processed form increased a significantly: in West Java, the share of potatoes that went into processing was only one percent in 1995; by 2005 that figure had risen to between five and ten per cent. This is part of the overall increase in processed food consumption in the country: consumption of processed foods and beverages increased 30 percent in the decade 1995-2005.

The rise of the large-scale potato processing sector is recent and important to the restructuring story. Small-scale potato processing (of *Granola* variety potatoes) was 'traditional' (not truly traditional in the sense of occurring over many centuries, but a recent tradition developed in the past half century) and the products were sold in the production areas. In 1991 the joint venture of Frito-Lay (US) and Indofoods changed that, with large-scale production of potato crisps and French fries. Several other large companies have emerged to compete.

The wholesale market system and the wholesale sector at the field level have also experienced fundamental restructuring in the past decade, driven by intense competition among wholesalers, their investments, the rise of supermarkets and the concomitant rise in the numbers of their agents, the fast rise of processors, and the implementation of contract farming schemes.

While the supermarket and food industry sectors develop alongside each other, the horticultural economies of local areas are hotbeds of dynamic change. Large, more capitalized wholesalers, supermarket specialized suppliers, and industry specialized suppliers have emerged as actors alongside the important remnant of small brokers. Many farmers − switching out of rice production and into FFVs – have been adopting irrigation, cropping multiple seasons, and shifting from low-value commodities to intermediate-value products (and even into high-value vegetables) in the process of climbing the 'value ladder'. Some lead actors are shifting commodity vegetable production to islands where land and labour are cheaper. Potato cultivation was popular among farmers 10 years ago, but because of limited seed potato availability, a decline in productivity, and high production costs, farmers are switching back to other high-value products.

A rapid growth in the land rental market led to horticulture farmers renting mainly from small-scale rice farmers and large-scale urban speculators. These active renter farmers were rice farmers who started cultivating vegetables a decade ago and then began renting land; then in the 'agricultural ladder' seen in other countries these farmers shifted from renting or sharecropping to land purchase.

In concentrated horticulture zones, an estimated five to six percent of horticulture farmers are starting to participate in sales to the supermarket channels, and one to four percent to the industry mainly − via the specialized/dedicated wholesalers and some large wholesalers.

2 Introduction

2.1. The role of agricultural economy

The agriculture sector in Indonesia grew on average at a rate of 2.82 percent between 2003 and 2006 − below the overall rate of national economic growth (5.39 percent) − and ranked eighth in sector growth in the economy (Table 1). Moreover the share of the primary agricultural sector has been continuously declining in the last two decades. In 1986, the agricultural sector still contributed 24.2 percent to the GDP, by 1996 this had dropped to 16.7 percent, and dropped even further to only 12.9 percent in 2006 (BPS 2007).

Table 1: Gross domestic product and constant market prices by sub-sector, 2003-2006 (billion rupiahs).

Industrial origin	2003	2004	2005	2006
1. Agriculture	240,387.3	247,163.6	253,726.0	261,296.8
a. Food crops and horticulture	119,164.8	122,611,7	125,801.8	129,211.2
b. Estate crops	38,693.9	38,849.3	39,810.9	41,081.8
c. Livestock and its products	30,647.0	31,672.5	32,346.5	33,309.9
d. Forestry	17,213,7	17,433.8	17,176,9	16,784.1
e. Fisheries	34,667.9	36,596.3	38,589.9	40,909.8
2. Mining and quarrying	167,603,8	160,100.5	165,085.4	168,729.9
3. Manufacturing industry	441,754.9	469,952.4	491,421.8	514,192.2
4. Electricity, gas and water supply	10,349.2	10,897.6	11,584.1	12,263.6
5. Construction	89,621,8	96,334.4	103,483.7	112,762.2
6. Trade, hotel and restaurant	256,516.6	271,142.2	293,877.2	311,903.5
7. Transport and communication	85,458.4	96,896.7	109,467.1	124,399.0
8. Finance and business services	140,374.4	151,123.3	161,384.3	170,495.6
9. Services	145,104.9	152,906.1	160,626.5	170,612.1
Gross domestic product	1,577,171.3	1,656,516.8	1,750,656.1	1,846,654.9
Gross domestic product without oil and gas	1,421,474.8	1,506,296.6	1,605,247.6	1,703,086.0

Source: Central Statistics Bureau (BPS), 2007.

The declining share of agriculture is already a pattern in the economy of developing nations − almost all countries start with income derived mainly from a primary sector (including agriculture) then as the economy more progressively moves into the industry and service sectors this share declines. Despite its declining share, agriculture is still the most important sector in providing employment to the economy. According to the Central Bureau of Statistics (2006), the agricultural sector still remains the highest job provider and supports more than 46 percent of labourers (or more than 42 million people). Hence, the agricultural sector in Indonesia remains

very important to the economy, especially from the employment perspective. Improvements to the sector will contribute to better income distribution and represent an effective policy toward poverty alleviation.

In the agricultural sector, the food crop and horticulture primary products make the highest contribution to the economy and the estate crop the second, both at an increasing rate (Table 1). The food crop primary product consists of rice and the secondary crop comprises vegetables and fruits. Among the secondary food crop, soybean, cabbages, and garlic show a declining production trend (Ministry of Agriculture 2006). Cabbage is among the lowest value and bulkiest of vegetables and farmers tend to shift to a product with a higher commodity value as commercialization increases (Natawidjaja 2006). Soybean and garlic have been facing tough competition from the import market. On the other hand, overall production trends for fruits seem to show a significant increase. Fruit and vegetable cultivation trends indicate a very dynamic development in terms of production and productivity.

In contrast to the situation in agriculture, the manufacturing industry sector − which has the highest share of GDP (28 percent) − only provides jobs to 12 percent of the labour force (which is about 11 million people). These data imply that workers in manufacturing can enjoy a bigger slice of the economic pie. However, if the industry sector is divided into two, agro-industry and non-agro-industry, the results are quite surprising. More than half of the industry contribution (68 percent) comes from the agro -industry (Table 2). Thus in total − including farm production − the agribusiness sector share of the economy is 32 percent, quite significantly higher than the agricultural primary sector alone.

Table 2: Labour force and output value of agriculture and industry sectors in Indonesia, 2000 – 2003.

Years	Labour force (million people)		GDP (billion rupiahs)			
	Agriculture	Industry	Agriculture	Agro-industry	Non-agro-industry	Total industry
2000	40.50	11.70	216,831.00	240,677.00	90,641.00	331,318.00
%	45.10	13.00	16.60	17.32	6.52	23.84
2001	39.70	12.10	225,686.00	242,783.00	104,647.00	347,430.00
%	43.80	13.30	15.64	16.83	7.25	24.08
2002	40.60	12.10	231,922.00	248,752.00	120,852.00	369,604.00
%	44.30	13.20	15.42	16.54	8.03	24.57
2003	42.00	10.90	239,036.00	260,011.00	129,672.00	389,683.00
%	46.20	12.00	15.20	16.54	8.25	24.79

Source: The World Bank, 2005.

2.2. Important agrifood sub-sectors

Food is an important part of the economy of Indonesia. In 2004, 55 percent of household expenditure went on food. Changes in the food economy thus have a major impact on the overall development of Indonesia and the well-being of its people. While food has traditionally meant 'rice' for most policymakers and researchers in the food economy in Indonesia, there is today a rapidly growing interest in the horticultural food products economy. This is partly because, apart from pockets of traditional export cropping, horticulture is the main agricultural diversification option (outside of dairy and aquaculture) for most Indonesian farmers trying to move out of low-value rice cropping. This is also because the horticultural food economy is important to consumers – while the average Indonesian consumer spent 49 rupiahs on FFVs in 1999 for each 100 rupiahs he/she spent on rice, by 2004 that ratio was 74 to 100 on average; however that average disguises the fact that the ratio was 95 on FFV to 100 on rice for the urban Indonesian (versus 59 to 100 for the rural consumer). Thus, for the half of the Indonesian population that lives in cities, FFV now stands equal to rice in importance in the food economy.

FFV production in Indonesia is concentrated in the islands of Java and Sumatra, respectively contributing 63 percent and 23 percent of the national production. There is no significant change in these islands' shares over the past decade. FFV production growth is helped by the favourable natural resources of the two islands, including the rich volcanic soils and advantageous climate. FFV growth is mainly driven by the private actions of farmers combined with the favourable natural resourc base, given that government investments and policy support to the sector are minimum (being instead mainly focused on rice). Of the five provinces with the largest horticulture production, West Java ranks first (32.36 percent), followed by Central Java (14.54 percent) and East Java (12.48 percent), whereas West Sumatra (11.04 percent) and South Sulawesi (2.71 percent) are not as large as the two first-mentioned provinces.

Generally, vegetable production in Indonesia in the past ten years has been increasing quite modestly (Table 3). The greatest production growth among vegetables is of potatoes, head cabbages, chilli peppers and shallots. (More detailed facts on vegetable production follow.)

Table 3: Fruit and vegetables production, Indonesia 1994-2004.

No	Commodity	Production (tons)			Percentage increase (%)		
		1994	1999	2004	94-99	99-04	Annual
Vegetables							
1	Potatoes	877,146	924,058	1,072,040	5	16	2.2
2	Head cabbages	1,213,924	1,447,910	1,432,814	19	-1	1.8
3	Leafy cabbages	370,852	469,996	534,964	27	14	4.4
4	Carrots	233,470	286,536	423,722	23	48	8.1
5	Tomatoes	476,124	562,406	626,872	18	11	3.2
6	Green onions	250,068	323,855	475,571	30	47	9.0
7	Chilli peppers	724,445	1,007,726	714,705	39	-29	-0.1
8	Shallots	636,864	938,293	757,399	47	-19	1.9
9	Garlic	134,940	62,222	28,851	-54	-54	-7.9
10	Cucumbers	456,025	431,950	477,716	-5	11	0.5
11	Long beans	453,351	386,188	454,999	-15	18	0.0
Fruits							
1	Durians	268,562	194,359	675,902	-28	248	15.2
2	Oranges	393,427	449,552	2,071,084	14	361	42.6
3	Mangoes	668,048	827,066	1,437,665	24	74	11.5
4	Papayas	406,587	449,919	732,611	11	63	8.0
5	Bananas	3,086,557	3,376,661	4,874,439	9	44	5.8
6	Pineapples	376,278	316,749	709,918	-16	124	8.9
7	Mangosteens	-	19,174	62,117		224	44.8
8	Avocados	93,267	126,104	221,774	35	76	13.8

Source: Horticulture DG, MOA, 2006.

- Even though potatoes, head cabbages, chilli peppers and shallots have the highest production compare to other vegetables, their production increase occurred only in 1994-1999, with production thereafter slightly decreasing. Only potatoes still demonstrate a constant increase at 2.2 percent annually.
- Green onions and carrots have the highest increase in production, nine percent and eight percent respectively annually from 1994 to 2004, with an accelerated rate of growth.
- Garlic, on the other hand, showed a very rapidly decreasing rate of production at eight percent annually. In the past ten years, the production dropped 54 percent. By contrast, there is a rapid increase in the import of garlic (as noted in Table 5). Some observers posit that garlic imports have driven down garlic prices and created a disincentive for local production.
- Tomatoes, an important vegetable in the Indonesian diet as well as a key item in supermarkets' FFV sections have been increasing at three percent annually in the past ten years.

National fruit production is increasing faster than that of vegetables (Table 3). More facts about fruit production follow.

- The highest fruit production in Indonesia includes bananas, mangoes, and papayas, the production of which has been increasing at six, twelve, and eight percent respectively every year in the past ten years. Among tree fruits, mango output is growing fastest.
- Mangosteen and orange production is growing fastest, at 45 percent and 43 percent annually on average over the past ten years, with most of the growth during 1999-2004.
- Local durian and papaya production has been growing at 15 percent and 8 percent annually respectively. In contrast with garlic, both local production and imports of durian are growing, suggesting strong demand and the competitiveness of local durian.

During the same period, exports of FFV in general declined, especially for vegetables (Table 4). More detail on FFV exports follows.

- The most exported vegetables are head cabbages and potatoes, together 70-90 thousand tons of exports in 1994. However, there is a declining trend in their export over the past ten years, with exports now less than 50 percent of those ten years ago.
- Other vegetables that used to be important exports (each more than a thousand tons in 1994) but which are now very modest in terms of exports (only a few hundred tons each) are tomatoes, carrots, turnips, leeks, and other alliaceous vegetables. Most vegetables are exported to Singapore markets.
- Papaya and pineapple exports increased rapidly over the past 10 years. Papaya exports used to be less than a ton and pineapple exports about 20 tons a year in 1994. Now, exports are 500 tons a year of papaya and almost 2,500 tons of pineapple.
- In contrast to these formerly niche items now growing quickly in terms of exports (papayas and pineapples), the main export fruits are showing only very slow export growth; mango (in 2004 at 885 tons) and mangosteen (2,687 tons) are increasing quite slowly, only by 11 percent and one percent respectively annually between 1994 to 2004.

Table 4: Fruit and vegetable exports 1994-2004.

No.	Commodity	Volume (tons)		Percentage increase (%)	
		1994	2004	1994-2004	Annual
Vegetables					
1	Cabbages [3]	71,736.7	32,210.6	-55	-6
2	Carrots and turnips [3]	2,223.1	313.4	-86	-9
3	Cauliflowers and broccoli [3]	186.4	1,340.6	619	62
4	Cucumbers [3]	19.5	10.2	-48	-5
5	Chicory	1.0	32.3	3,034	303
6	Garlic [3]	6.7	30.3	350	35
7	Gherkins [3]	0.5	261.6	55,805	5,580
8	Leeks and other alliaceous vegetables.	1,781.1	77.9	-96	-10
9	Potatoes	89,123.6	16,553.8	-81	-8
10	Shallots [3]	6,843.3	4,637.3	-32	-3
11	Tomatoes [3]	3,744.5	751.6	-80	-8
Fruits					
1	Apples [1]	4.8	241.5	4,912	491
2	Avocado [4]	1.1	5.4	387	39
3	Bananas [1]	33,148.5	1,197.5	-96	-10
4	Durian [1]	210.0	1.5	-99	-10
5	Grapes	36.0	189.2	426	43
6	Lemon [1]	62.6	139.5	123	12
7	Mandarin [1]	9.7	487.7	4,949	495
8	Mango [3]	885.1	1,879.7	112	11
9	Mangosteen [3]	2,687.4	3,045.4	13	1
10	Orange	89.3	641.2	618	62
11	Papaya [3]	0.1	524.7	529,886	52,989
12	Pears and quinces [1]	16.4	378.3	2,207	221
13	Pineapples [4]	21.9	2,431.3	10,998	1,100

Source: Central Statistical Bureau (BPS), 1994a, 2004a.

Note 1) = Fresh, 2) =Dried, 3) =Fresh or chilled, 4) =Fresh or dried, 5) = Including seeds.

In contrast with the generally lacklustre export performance of FFV, imports of FFV are growing at spectacular rates, as shown in Table 5.

Table 5: Fruit and vegetables imports 1994-2004.

No.	Commodity	Volume (tons)			Percentage increase (%)		
		1994	1999	2004	94-99	99-04	Annual
Vegetables							
1	Cabbages [3]	308.9	346.4	191.4	12	-45	-4
2	Carrots and turnips [3]	103.5	167.9	5,239.1	62	3,021	496
3	Cauliflowers and broccoli [3]	160.3	202.3	303.4	26	50	9
4	Cucumbers [3]	757.4	103.7	0.7	-86	-99	-10
5	Chicory	92.1	33.5	11.0	-64	-67	-9
6	Garlic [3]	29,625.6	178,046.0	243,720.7	501	37	72
7	Gherkins [3]	26.9	0.4	4.3	-98	968	-8
8	Leeks and other alliaceous vegetables	90.6	7.3	172.2	-92	2,262	9
9	Potatoes [3] [5]	5,837.1	12,908.4	8,906.2	121	-31	5
10	Shallots [3]	15,213.3	35,775.3	48,927.1	135	37	22
11	Tomatoes [3]	219.0	245.8	120.2	12	-51	-5
Fruits							
1	Apples [1]	31,428.3	33,429.1	114,030.5	6	241	26
2	Avocado [4]	15.5	8.3	29.9	-46	260	9
3	Bananas	58.8	384.6	408.8	555	6	60
4	Durians [1]	431.9	19.4	11,086.8	-96	57,010	247
5	Grapes	5,804.8	3,565.9	30,152.5	-39	746	42
6	Lemons [1]	127.3	161.9	286.3	27	77	12
7	Mandarins [1]	8,850.9	27,089.7	43,416.6	206	60	39
8	Mangoes [3]	7.9	33.5	688.7	323	1,954	859
9	Mangosteens [3]	0.0	0.1	0.3	11,300	159	2,940
10	Orange	18,462.7	7,398.4	50,937.5	-60	588	18
11	Papayas [3]		2.5	1,789.9		71,467	14,293
12	Pears and quinces [1]	7,743.2	12,307.3	74,276.5	59	504	86
13	Pineapples [4]	1.6	0.4	0.0	-75	-99	-10

Source: Central Statistical Bureau (BPS), 1994b, 1999b, 2004b.

Note 1) = Fresh, 2) =Dried, 3) =Fresh or chilled, 4) =Fresh or dried, 5) = Including seeds.

- Garlic became the number one imported FFV item in 2004. Over the past two decades, garlic imports have increased an amazing 72 percent annually. The total garlic imports in 2004 equal 243.7 thousand tons, some ten times any major fruit item export. As noted above, while imports are up over the past decade, the trend in production is down.
- Apple, pears, and oranges are among the most imported fruits. Over the past five years, imports of these have together tripled. This is merely part of a longer trend – as these three items had 26 percent, 86 percent, and 18 percent annual growth rates over the past two decades, respectively. Mandarin oranges and grapes also

increased by 39 percent and 42 percent respectively annually in the past two decades, and are major imports, at 30 to 100 thousand tons per year.

- Shallots and carrots imports increased very rapidly in the past 5 years – including 22 percent a year in the case of shallots. Imports of carrots skyrocketed over the past five years – with a mere 160 tons in 1999 to about 5,000 tons in 2004.
- Although most imports are of fruit, and most of the imported fruit is temperate zone fruit, there is actually a lot of overlap in types of products produced in Indonesia and imports. Sometimes the imports and local compete in the same season, but often they are in different seasons. However, the types of vegetables that are imported and are also grown locally are important (cabbages, carrots, cauliflower, broccoli, garlic, potatoes, shallots, and tomatoes). Moreover, much of the imported fruit is also grown locally: apples, avocados, bananas, durian, lemon, mango, and papaya.

2.3. The key policy issues

First, despite a strong potential in production and a large variety of FFV, Indonesia is exporting less and less and importing more and more FFV. Despite government efforts to increase exports of horticultural products, these are declining. It appears that part of this is because local farmers have great difficulties in producing a consistent quality with consistent quantity over the time. Besides, a number of requirements for export make it hard for farmers to export. In sharp contrast, FFV imports are growing quickly. As will be discussed in later chapters, supermarkets join other retailers in selling imported fruit, noting better quality and consistency and lower prices in the cases where imported items are also grown locally (as in the case of oranges, carrots or garlic for example). Retailers interviewed tell us that consumers perceive those same advantages in imported FFV; shared perceptions or not, consumers are voting with their rupiah and buying rapidly increasing amounts of imported FFV.

Second, the government spends lots of effort in policies to increase farmers' access to markets but the road is littered with many failed programs and few obvious successes. Many programs have been developed (such as the creation of farmers groups, cooperatives, and product collection and marketing centers (in particular, 30 "agribusiness sub-terminals"), but are widely acknowledged to have produced little. Farmers continue to face major constraints of lack of capital, technical knowledge, and access to land. That the government's agricultural budget is limited, and that political pressure forces an overwhelming emphasis on rice rather than horticulture products, are up to now not promising for substantially increased government support for horticulture.

Third, over the past (and virtually only over) the past five years, supermarkets have gone from tiny sales of FFV to what we very roughly calculate (and show in a later chapter) is as much as 500 million dollars of sales of FFV, with about 2/5 of that local FFV, and 3/5 imports. At the same time, the food industry is also growing along with the expansion of the modern retail market since the two perfectly marriage for the same need, ie. the mass market. At issue is whether local farmers can be competitive in quality and cost and increase their share and level, and what policies are needed to help them access this new market channel in a way profitable to the farmers and thus useful to the goal of increasing incomes through market access and agricultural diversification.

2.4. The objectives and key research questions of the study

The study aims to investigate the key patterns of dynamic market restructuring in Indonesia and its determinants, at the national as well as local level. The changes in the retail sector have indicated a corresponding series of changes in the agrifood sector, which are among the key determinants for farm investments and innovations. In more specific terms, the research questions of this study are:

1. Where are the modern market and agrifood industry sectors successfully sourcing from small farms/firms, and what appear to be the conditions for this success? What is the potential of the modern market/agrifood industry sectors or their dedicated wholesalers to provide technology dissemination services that would improve small farmer competitiveness or profitability?
2. What are the distribution impacts of the rise and consolidation of the supermarket and agrifood industry sectors on the farming and processing sectors? Who are the winners and losers, and why?
3. What are the costs and the benefits explicit and implicit to small farmers and processing firms in producing for, and sell to, supermarkets or agrifood industries compared to traditional market channels? What types of competitive pressures from supermarkets might lead to local farmer loss of market share or constitute a barrier to local farmer entry in retail markets? What types of smallholder production systems (sets of assets and technology, and commercial practices) are most amenable to the types of change necessary to successfully link smallholders to supermarkets?
4. What are the programme and policy design implications for effective government and donor actions (such as extension, irrigation investments, and so on) and private programmes to address challenges facing small farms and firms seeking to be 'included' in the markets dominated by supermarkets and industry? What are the technical assistance activities that, if replicated in part

or in whole, would assist government/donors/the private sector in profitably linking small farmers to supermarkets and the industry?

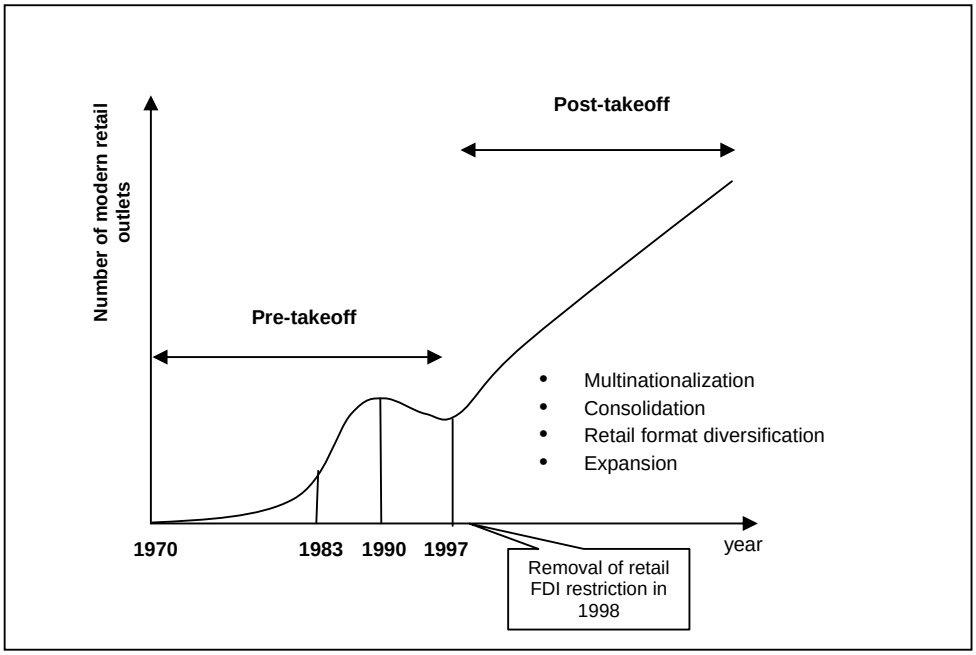
3 Changes in the national food systems

3.1. National food market restructuring

3.1.1 Food retail change in Indonesia

The Indonesian experience in many ways runs parallel to the international trends noted previously in this paper in terms of both the patterns and the determinants (compared to trends noted in Reardon and Timmer 2007). Figure 1 shows the diffusion of supermarkets in Indonesia from 1970 to 2005. There were three distinct stages. The first and second stages were in a general period that can be termed the "pre-takeoff, domestic cycle period" (before 1998). From roughly 1970 to 1983, the supermarket sector in Indonesia was a tiny niche serving expatriates and upper-class Indonesians, mainly in Jakarta. Supermarket diffusion became rapid from a very tiny base starting in 1983, then peaking in the early 1990s and declining by the start of the Asian financial crisis in 1997. This second stage was fuelled by overall growth translating into rapid growth in upper-class incomes in Java. This first growth spurt of supermarkets was almost exclusively domestic capital retail and was still focused on the upper income segments (mainly in Jakarta and a few other large cities on Java where the 'New Order' growth was concentrated).

Figure 1: Development of supermarkets in Indonesia.



The third stage was the veritable "takeoff period" of supermarkets, when the sector moved from a tiny niche to a large sector and this trend looks set to grow quickly for some time to come. Several factors appear to have driven the rapid supermarket growth observed since 1998.

1. Various socioeconomic 'demand-side drivers' were in place Firstly, there has been very rapid urbanization: while 42 percent of the population was urban in 2000, the urban share was only 31 percent in 1990, and 22 percent in 1980. Extrapolating from the urbanization rate from 1990 to 2000, that would make the urban share in the population about 50 percent by 2005, with most Indonesians classified as urban from 2006 onwards. Secondly, real GDP/capita has grown three percent per year on average over 2000-2004 (PlanetRetail 2006).

2. The demand-side drivers would appear to be necessary (and were present before the "take-off period" in 1998) but not sufficient. There was in addition a massive investment-side spur. As part of the economic recovery programme negotiated with the IMF, retail foreign direct investment (FDI) was liberalized in 1998. The Indonesian government had closed the retail sector to direct foreign investment since 1969 in an effort to protect local retailers. However, there is a loophole in the regulation for foreign investment to enter the Indonesian market through franchises and technical arrangements with local companies. The aggressive entry of foreign retailers took place after the economic crisis that hit Indonesia in 1997. On January 15th 1998, the Indonesian government signed a letter of intent with the IMF stating that the Indonesian government should revoke the ban on foreign investors' entering the wholesale and retail businesses. Later, the opening up of Indonesian markets to foreign investors was legalized by a Presidential Decree No. 99/1998 and a Decision Letter of the State Minister of Investment (Head of Capital Investment Coordinating Board) No. 29/SK/1998. The regulations stipulated that the licensing procedures and all other requirements that a foreign retailer has to fulfil are the same as those applicable to local large-scale retailers. Interestingly, unlike in the Philippines where FDI liberalization was bitterly contested and slowed (until 2000) by traditional retailers associations (see Cabochan 2005), in Indonesia there was relatively little opposition − perhaps because it occurred as part of the policy package applied during the crisis.

   This led to a rapid influx of FDI in retail and competitive investments by domestic retailers, just as it had done in dozens of other developing countries that liberalized retail FDI in the 1990s as part of various structural adjustment and trade liberalization programmes (Reardon and Timmer 2007). The subsequent economic recovery, the low cost of investment (relative to home markets), and the liberalized FDI attracted foreign modern retailers to Indonesia, initiated by the entry of Continent and Carrefour (French retailers)

which introduced the 'hypermarket' concept. Other foreign retailers entering at that period were Wal-Mart and Giant (Dairy Farm Group of Hong Kong). This period may be said to be the initial period of multinationalization. This ratcheted up the competition sharply by the end of the 1990s and the early 2000s, which induced some consolidation in the retail market. For example, Continent was acquired by Carrefour, Hero Group acquired Tops (the Dutch Ahold), and Hero Group joined Giant to establish Giant hypermarket. Besides business consolidation, a change in modern retail format orientation also took place; i.e., the Matahari Group that previously grew in a department store business format developed a hypermarket format under the name of Hypermart. Local retailers such as Yogya, which started in Bandung as a department store, also developed a supermarket format under the name of Griya, and later a convenience store format under the name of Yomart.

3. Investment in urban real estate also developed rapidly after near collapse in the crisis, and real estate market access is crucial to rapid supermarket diffusion. The rate of growth of the supermarket sector in the "take-off period" has been spectacular indeed. From 1997 to 2003, supermarket sales grew 15 percent per year on average – versus only five percent per year for traditional retailers (Rangkuti 2004). The supermarket sales share must have been, by rough calculation, very small in 1990 judging by the huge difference in numbers of stores then and now, so the share in retail might have been less than five percent (and was probably between two and three percent as it is in India today). By contrast, the share in retail in the first half of the 2000s was far higher.

Table 6 shows the shares of supermarkets/hypermarkets and chain convenience stores (e.g., the modern retail sector) in total food retail in the past five years, based on ACNielsen (2004). Note that ACNielsen does not cover FFV in its database, so these figures cover processed and semi-processed products and some fast-moving non-foods. The share of modern retail in the retail market was 21.6 percent in 2000, and had rocketed to 29.6 percent by 2004, or an increase of 8 percent within only 4 years based on 47 items surveyed in Jakarta. (This was a share of an expanding market, but nevertheless the share of the traditional retailers correspondingly dropped by 2 percent a year.) This rate means that at the time of writing, the share of modern retail is about 35 percent in Indonesia (approximately the same as Thailand in the late 1990s, South Korea in the mid - 1990s, or Guatemala in recent years). We note as an aside that while chain convenience stores are numerous, they are small in size and the overall share of chain convenience stores retail is only about a quarter of modern sector sales. (This is typical, and even slightly high, compared to other countries.)

Table 6: Number of retail outlets and sales 1999-2003, Indonesia.

Type of outlet	Description	1999	2000	2001	2002	2003
Hypermarket	Outlets	6	7	8	11	13
	Retail sales (billion IDR)	1,446	1,649	1,995	2,720	3,590
Supermarket	Outlets	1,173	1,210	1,255	1,312	1,377
	Retail sales (billion IDR)	8,517	9,215	9,981	10,756	11,625
Convenience stores	Outlets	1,025	1,121	1,225	1,325	1,615
	Retail sales (billion IDR)	2,021	2,315	2,615	2,946	3,328
Independent grocers	Outlets	70,300	74,952	80,031	85,421	91,305
	Retail sales (billion IDR)	24,751	28,219	32,033	36,246	41,201
Cooperatives	Outlets	74,751	79,512	84,510	89,748	95,264
	Retail sales (billion IDR)	6,899	8,075	9,161	10,802	12,003
Warehouse clubs	Outlets	22	23	28	29	29
	Retail sales (billion IDR)	3,669	3,831	4,002	4,185	4,385
Wet markets		10,430	10,452	10,475	10,502	10,532

Source: Rangkuti, 2004.

Table 7 shows the top eight retail chains in Indonesia. There is no reliable source of information about all the retail chains in Indonesia, so there is currently no accurate way to assess the concentration ratio. In general, retail experts agree that the concentration ratio is still relatively low, with many small chains and independent supermarkets beyond these top 8, and thus the modern retail sector is still significantly fragmented. However, an examination of the top 8 is revealing of several key aspects of the frontrunners, points which we supplement with several observations from the West Java interviews as follows:

- The total retail banner sales of the top eight are 4.3 billion USD. The ratio of sales of the first to the last ranked is five times; if one looks only at the top 7, the ratio of the first to the last is only 2. This indicates that there has not yet been a process of marked consolidation.
- There are two types of domestic-capital leaders. The first is the old domestic chain with department store roots, and the second is the convenience-store focused chain.
- The convenience store chains are opening many stores in the smaller cities and even rural towns, to the point where we heard sharp complaints from the West Java government about ruinous competition between the new convenience store chains − as conduits for goods from imports and large-scale domestic processing firms − and small-scale local firms in rural towns (Dinas Perindustrian dan Perdagangan Agro, Government of West Java Province).
- The average growth of chain sales was 160 percent over the five years, a rapid growth rate in comparison with income/capita growth.
- Smaller, provincial chains were also growing very fast. For example, Yogya had only 25 stores in 2002, but had 47 supermarkets and 1 convenience store by April 2006 – a near doubling of stores. A smaller chain, Borma − based, like Yogya, in Bandung − was established in 1980, but only started its rapid growth in 1998 in the "takeoff period"; it had 15 stores in 2000 and now has 20 stores.
- Several of the chains, such as Makro, have important cash and carry operations. These are basically wholesalers selling to small shops and restaurants (the latter category rising very sharply in the past few years) and competing with the wholesale markets. Makro informed us that some 20 percent of their sales are direct to consumers as retail.

There are several factors that indicate this trend will continue, and that by 2010 nearly half of food retail will be through supermarkets.

1. Leading figures in the retail and suppliers sectors (who told us this in our interviews) strongly believe that the trend will continue for the reasons noted immediately below.
2. Modern retail has quickly penetrated processed and semi-processed products, and is now making important inroads in FFV as an emerging focus. They are reducing costs and improving their competitiveness as they go.
3. Modern retailers are spreading beyond Java to other islands, and beyond large cities to secondary cities and even smaller towns, rapidly. They see much potential in that spread, feeling that the market is far from saturated except in a few pockets of Jakarta.

4. But perhaps the most often cited reason is that there is starting (and most retailers expect it to continue) a big wave of renewed FDI as other major retailers work to enter Indonesia over the next few years. This will heat up the competition.

Table 7: Top eight retail chains in Indonesia.

Chain	2005 retail banner sales, mil. USD	2005/2001 retail banner sales, 2001 = 100	Format shares of total sales	Groceries share of total sales (%)	Capital nationality	Market reach
1. Matahari	764	94	60% dept. store, 21% hypers, 12% supers	28	National	Asian regional (now in China)
2. Alfa Retailindo	697	165	49% conv. store; 22% cash/carry; 29% supers	90	National	National
3. Carrefour	644	255	100% hypers	70	French	Global
4. SHV Makro	566	135	100% cash/carry (authors: but 20% retail)	80	Dutch	Global
5. Ramayana	537	128	77% dept.store, 23% supers	24	National	National
6. Dairy Farm/Giant/Hero	455	165	47% hypers, 42% supers	74	Hong Kong	Asian-regional
7. Indomaret	420	197	100% conv. stores	95	National	National
8. Delhaize/ Lion Super Indo	144	160	100% supers	90	Belgian	Global

Source: www.planetretail.net, accessed November 19, 2006, with some authors' calculations and notes.

3.1.2 Supermarket diffusion

As supermarkets spread in Indonesia, several patterns in their diffusion emerge:

- Supermarkets are spreading beyond the upper income niche into the middle class (consumer segments A and B, in retail parlance) and starting in the markets of the C and D consumer segments (the lower-middle and working-poor). This is

happening faster and earlier in processed products compared to fresh products. This mirrors the international experience.

- Supermarkets are spreading beyond the Jabotabek (Jakarta, Bogor, Tanggerang, Bekasi) area into other large cities (first on Java and then on other islands) and then into secondary cities on Java and the other islands, and finally recently into small towns (via convenience stores and small supermarkets) on Java. While nearly all the supermarkets were in Jabotabek (the greater Jakarta area) in the mid -1990s, by now only 60 percent are. This again mirrors the international pattern. Note that this pattern occurs even in a given province; for example, the Yogya chain focused only on Bandung some 5 years ago but now has stores peppered around the secondary and tertiary cities in West Java.
- FFV was of minor importance to supermarkets in the 1990s. The great majority of our retail informants note that FFV has gone from a tiny share of supermarket sales in 2000 to a moderately important section today, and is growing. Some observers (such as in our interviewee at USDA/Jakarta) note that there are signs of the produce section entering the 'strategic' status; she noted that this was signalled by leading chains moving the produce section from the back of the store to the front. This mirrors similar 'inflection points' in other countries.
- The corollary to the above point is that the share of supermarkets in total retail of FFV has grown. However, it is difficult to ascertain with precision how much it has grown and what the share is today. Partly this is because neither ACNielsen nor APRINDO nor any government agency follows the market segmentation of FFV and partly this is because it is risky to apply some ratio to the supermarket share of food and other fast moving groceries estimated from survey data by ACNielsen – because the share of FFV in supermarket sales differs over chains, as we see above. We report instead the estimates by our interviewees. Most of the retailers and specialized suppliers agreed that roughly 15 percent of the FFV retail market is now dominated by supermarkets, and that just five years ago that figure was at best five percent. They all agree that it is growing. Some estimated higher shares, such as APRINDO's estimate of 20 percent. In general, this estimate mirrors what is happening in most other developing countries for which we have estimates: that the share of the FFV market is about one-half of the rate of penetration in the overall food market.
- Based on an average from our interviews of the share of FFV in supermarket sales, and estimates of the total sales of supermarkets, we made a (very) rough estimation of the order of magnitude of current supermarket sales of FFV in Indonesia. Even at this early stage, supermarkets in Indonesia sell an estimate of 500 million USD (5 trillion rupiahs) of FFV per year, or 1.5 billion USD of all fresh foods. From that value, 300 million USD was imports and 200 million was local produce. That was larger than exports of FFV from Indonesia in 2004. We turn next to the point concerning imports and explain in more detail.

- The imported share of the FFV sold in supermarkets in Indonesia is surprisingly high. According to the fresh food managers of major retailers that we interviewed (and our own store visits and counts of fruit and vegetables), about 65 percent of FFV sales of supermarkets are fruit, and 35 percent vegetables. Roughly 60-80 percent of the fruit sold are imported, but only about 15-20 percent of vegetables are imported (although that can rise to 50 percent in certain seasons). In general, about 60 percent of FFV sales are from imports, which is roughly twice as high as the import share in comparable countries (such as Mexico, China and Guatemala). Interestingly, most of the interviewees noted that rather than falling, the share of imports in total fruit sales is rising; Giant for example told us that fruit constitutes 70 percent of their FFV sales − 80 percent of their fruit is imported now while five years ago that share was only 60 percent.

  In general, the reason for the dependence on imports is that the supermarkets feel they can get the same or better quality for lower prices − mainly from China and Thailand. The essential point is that these latter countries are simply doing a better and better job at selling their fruit and vegetables to Asian supermarkets. There are also some products imported from other countries (such as oranges from Pakistan, onions from Australia, and so on). While some of the fruit is imported off-season, there are many items that are imported at the same time as these items are available (but at higher cost, or lower quality, or simply less consistently) locally.
- The supermarket FFV section has relatively concentrated sales in a small number of items. For example, in Matahari hypermarkets, 80 percent of the volume is from 70 stock-keeping units (SKUs), while another 20 percent of the volume from another 370 SKUs. Giant in Bandung told that their top seven vegetables are: (1) imported carrots (better in terms of consistency and quality than the local carrots); (2) local shallots; (3) local potatoes; (4) local carrots; (5) tomatoes; (6) imported onions; (7) local garlic. The top 7 fruits they sell are: (1) imported lukam from China; (2) imported apples from China; (3) Red Glow grapes from the US; (4) mandarins from Pakistan; (5) pears from Shandong China; (6) Yali pears (China); (7) Skyrocket melons (local or imported). For Yogya, a regional chain based in Bandung who noted that they sell 15 billion rupiahs of FFV per month, their top 5 fruit are: local mangoes, local citrus, and Cavendish bananas, and the rest are imported; the top vegetables are: imported carrots, local garlic, local potatoes, local tomatoes. They, and other retailers, have added organic and low pesticide products lately and that rubric is growing.
- At present most of the retailers see each other as their main competitors, but they are also trying, gradually, to win over the mass market. For example, Carrefour has "wet market days" and also has a regular promotion (high discounts on main FFV items) on the weekends. For most of the retailers, the promotion campaigns are led by imported FFV as those are often cheaper.

3.1.3 Emerging modernization of produce procurement systems among leading national and regional chains

A. Centralization (shift to use of DCs):

Mirroring the international trend, there is a tendency to move from store-by-store procurement (buying from local producers) to centralized procurement via the use of distribution centres (DCs). This move has come relatively early for fresh produce possibly because much of the vegetable and fruit production and fruit imports are either in Java, or easiest to access in Java and send to stores around Java and by ship to the other islands (or to import directly from the other islands). Thus the DCs tend to be established on Java, but the national chains have plans to build DCs on other islands as a second step. In general, and mirroring the international experience, the largest/lead chains (first the foreign chains and then the largest national chain) recently established fresh-produce DCs with cooling facilities. Most of the capacity is used for imported fruit and some for local fruit and key bulk vegetables which are received in the DC and then distributed after packing or minimal processing out to the stores. In general, suppliers distribute leafy produce directly to the stores (a common practice in all the chains we interviewed, and indeed a common practice among Latin American and Eastern European retailers) and some fruit is delivered direct to the stores. The next stratum is the large regional chain that very recently established a small DC for fresh produce. The final stratum is the small chain (in this case, regional) that still uses the traditional (for supermarkets) method (i.e., with no DC) for fresh produce, with all sent direct to stores from the suppliers. Details from the interviews illustrate these points as follows.

B. Pursuit of avoiding reliance on traditional wholesale markets:

The supermarket chains expressed a generalized desire to circumvent the use of the traditional wholesale markets. There was a universal and strongly expressed view among all the retail chains interviewed concerning the following specific points:

1. The chains want to minimize their use of the wholesale markets such as those discussed above. One retailer told us: "(Big chain) in Malaysia was sourcing from the wet market [the main wholesale markets], but the wet market/wholesale market in Malaysia is far better than in Indonesia: the Indonesia wholesale market is dirty, not professional; when (our chain) was sourcing vegetables the from wholesale market in Jakarta, we had to spend a huge amount on labour to sort, pack, and transport." Another retailer, expressing telegraphically what we heard in all the retail interviews, said "The main wholesale markets in Indonesia are terrible." The main complaints are that they are dirty, small, congested, and traders and buyers alike are charged by various groups operating in the markets what we can here term "informal charges" that add significantly to total costs.

2. The chains seek to reduce as much as possible the set of wholesalers on which they rely. This is because most chains find that there are too many 'links in the chain', that there are too many 'hands' which are only adding cost but − from their perspective − little value. To that cost of intermediation the retailers noted that there are substantial problems of extra payments, along the highways, of "informal charges" to various people. The retailers also complained of various handling and post-harvest practices of the traders (poor packaging, poor handling, lack of consistency in volumes and quality, and lack of respect for transaction agreements). As a consequence, all the retailers noted their fervent desire to cut out as many wholesalers and field brokers from their supply chain as is practicable.
3. Where the chains rely on wholesalers, they strive to work with those who add value through their activities, such as finding and coordinating skilled farmers, cleaning and transporting the product, and assuring inter-island service. We will show below that the modern retailers have moved quickly (in relative, international terms) to sourcing from these intermediaries and away from the traditional wholesale channels.

C. Imported-FFV sourcing occurs mainly via large importer-wholesalers and also through some direct sourcing:

In general, the global retailers (Carrefour and Makro) tend to import directly, using their regional sourcing hubs in Asia, but supplement that with the use of local large importer-wholesalers. The other large chains (national or regional) mainly use large importer-wholesalers who are also inter-island traders (and thus "one stop shopping" for certain lines of produce) and supplement that with some direct purchase. The smallest chain tends to rely on importer-wholesalers. One can say that the procurement system is essentially traditional, relying on large importer-wholesalers, with some non-traditional elements such as the regional sourcing hubs of the global retailers. All the retailers note the relative ease of importing versus wrestling with the local inadequate supply chains. There is some (but not complete) complementarity between imports and local FFV.

The main imported fruits are oranges, apples, grapes, pears, monthong durians, and kiwi fruits. While there are local oranges (from Medan) that compete with imports (as does the durian) the prime local fruit are mangoes, pineapples, mangosteens, snake fruits, bananas, and watermelons. Sometimes there are imports of several of these local fruits beyond oranges and durian, for example in the case of imports of bananas from the Philippines, or mangoes off-season.

The main imported vegetables are carrots, garlic, onions, and broccoli. The main local vegetables are tomatoes, cabbages, radishes, potatoes, ongcoy, and peppers. There is mainly competition with respect to onions, carrots and garlic. In addition, there are

also local "import substitution" vegetables − such as Japanese and other foreign vegetables − produced in the regions of Cipanas, Cianjur and Lembang, such as okra, zucchini, kyuuri, shisito, horinso, pakcoy and edamame.

D. Local fruit sourcing:

In general, the modern retailers tend to rely on large wholesalers (who supply to all market segments) who have inter-island operations (and thus can assure continuity over seasons and also only a few suppliers known to the chain over several locations). These large wholesalers have stalls in the main wholesale markets, and if they are also importers, have warehouses at the various island ports. One can say that the local fruit wholesale segment appears to be very concentrated; as in Mexico, the interface of the supermarket sector and the traditional wholesale market is almost exclusively through very large, nationally-integrated and spatially dispersed wholesalers who act as one-stop-shopping for retailers (and are often importers as well). A secondary method of sourcing, done mainly by the larger chains (as expected) is direct sourcing from medium-sized suppliers (farm-companies, cooperatives, and some individual larger farms). The leading retailers told us that they want to increase the direct sourcing method thus − as all retailers say in all countries − reducing margins paid to wholesalers. The issue is the feasibility of this: they noted that it is hard to compete with the giant wholesalers who move into a production zone and pay farmers in advance or pay a higher price near the point of delivery.

E. Local vegetables sourcing:

In general, procurement system modernization has proceeded most significantly in the domain of vegetables. Partly this is because it is less feasible and more costly in transport (relative to their prices) to import vegetables (except for the half dozen we noted), and partly this is because there are good local sources (but with poor supply chains) from those sources to the stores. Thus, the modern retailers have shifted en masse, to a large degree, away from use of the wholesale markets toward use of specialized wholesalers. However, that shift is not yet complete, as they still use the wholesale markets directly or indirectly for a minority, perhaps a large minority, of their products, especially the many small-share vegetables, and also some of their suppliers in turn source from large wholesalers (similar to the large wholesalers of fruit) in the wholesale markets. One might then say that on balance the vegetable procurement system is semi-modernized or quasi-modernized, but with a strong will of the leading chains to keep it moving in the direction of further modernization. Again, as with fruit, the smaller chains tend to have progressed less far in regard to modernization. Finally, only one chain, Carrefour, is actively involved in local supply chain improvement through upgrading, and that is proceeding by way of a bumpy, albeit continuous, route.

3.1.4 Emerging role of specialized/dedicated wholesaler and medium/large commercial farmers

The modern retail market development which favours centralization of provision and distribution has spurred the emergence of several types of new modern retail market suppliers. We say "emergence… of new types" to highlight not their innovativeness on some absolute or international scale (in fact they have been emerging all over the developing world over the past four to ten years, see Reardon and Timmer 2007), but to emphasize that these actors are new in purpose, market segment focus, and mode of operation compared to the traditional wholesalers − not to mention the conventional small-scale farmers.

These types of suppliers emerged to supply high volumes to supermarkets and other modern segments like food service, with the requisite stability of volumes and consistency of quality. That in turn implies producing or collecting (from wholesalers or from contracted farmers or from both) a variety of products, then sorting, minimally processing, packing, and delivering them to stores or DCs.

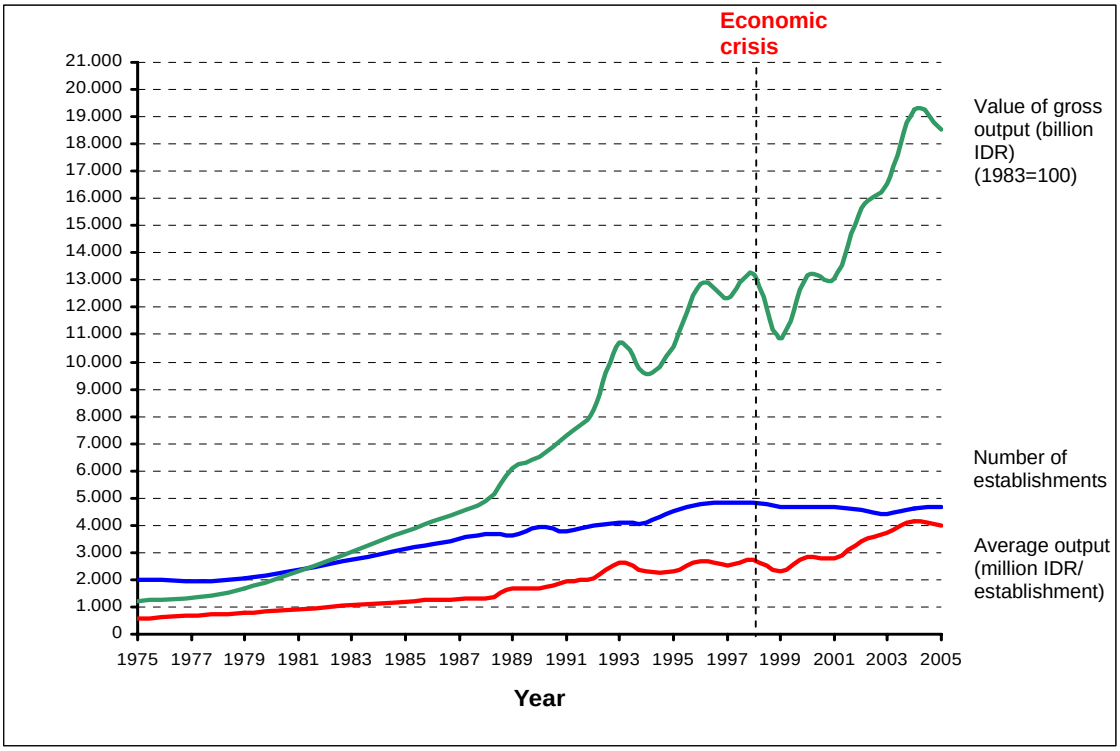
Examples of these emergent suppliers are firstly specialized/dedicated wholesalers without their own production (Bimandiri) and with their own production and outgrowers (Putri Segar, Saung Mirwan); and secondly, commercial agricultural companies with their own production and outgrowers (Hikmah; Pak Deding; Haji Ruffiat, Amazing Farms; Lyco Farms and Bukit Organic).

In concentrated horticulture zones, an estimated 11-15 percent of horticulture farmers are starting to participate in sales to the supermarket channels, mainly via specialized/dedicated wholesalers and some large wholesalers mentioned above. These new actors are different from regular traders since they are also arrange for the farmer to follow a planting schedule and give technical assistance in farming and post harvest handling. They have been linking farmers to the more dynamic market.

3.2. The development of the food industry

The food industry in Indonesia grew very rapidly during the period 1986-1996, which coincided with the "pre-take-off period" (domestic cycle) of the supermarket sector (Figures 1 and 2). During this period, the number of stores grew by 45 percent but the gross sales value doubled (210 percent) in constant value (1983=100) (Table 8). This table shows that the tremendous increase of gross value was achieved mostly by an increase in gross output per store rather than by an increase in the number of supermarkets, which implies an improvement in production technology. Comparing Figure 1 and 2, a clear pattern emerges that shows that sales growth in the food industry was in response to the retail market restructuring, which was caused by domestic market expansion.

Figure 2: Food and beverages industry development in Indonesia.



In the period of economic rehabilitation of the 'New Order' government (1969-1972) and the period of the oil price boom (1973-1981), government policy was supporting the industrial sector very positively, especially in regards to an import substitution industry. The policy was also geared toward attracting foreign direct investment (FDI) to Indonesia. According to the World Development Report, FDI in Indonesia increased by about USD 100 billion per year in the 1980s. Then in 2000, the investment reached USD 1,167 billion. The fast growth in this sector is a result of the internationalization of the retail market and high investment in the industry as well as a consequence of Indonesian economic expansion.

The industry was hit hard by the economic crisis of 1997. During the five years after the peak of crisis (1997-2003) about 462 establishments in the food industry could not survive and disappeared. Before the industry could fully recover from the crisis, there was also a series of domestic energy price hikes (fuel, gas and electricity), which happened mainly in 2003 and 2005. The high price of energy has created a higher cost burden to the industry since the hikes increased almost all input prices, created higher inflation, and shrunk the industry's profits.

Table 8: Number of established large/medium food and beverages industries in Indonesia 1975-2005 and value of gross output.

Year	Number of large/medium establishments	Value of gross output (billion IDR)		Average gross output (million IDR/establishment)
		Nominal price	Constant price (1983=100)	
1975	2,012	397	1,195	594
1979	2,057	1,179	1,666	810
1986	3,294	5,483	4,149	1,260
1988	3,697	8,050	4,883	1,321
1989	3,621	10,816	6,093	1,683
1990	3,924	12,175	6,511	1,659
1991	3,790	13,454	7,285	1,922
1992	3,988	17,913	8,261	2,071
1993	4,094	24,163	10,731	2,621
1994	4,102	23.434	9,546	2,327
1995	4,536	29,332	10,576	2,332
1996	4,767	35,185	12,849	2,695
1997	4,856	38,897	12,325	2,538
1998	4,856	67,503	13,207	2,720
1999	4,666	72,852	10,888	2,333
2000	4,661	92,399	13,160	2,823
2001	4,681	104,067	13,087	2,796
2002	4,551	133,515	15.625	3,433
2003	4,414	162,388	16,532	3,745
2004	4,638	171,317	19,292	4,159
2005	4,648	197,015	18,555	3,992
Increase/decrease				
1975-1985	39%	93%	71%	82%
1986-1996	45%	542%	210%	109%
1996-2005	-2%	460%	44%	48%

However, even suffering a hard blow from the economic crisis and an increase in energy costs, the value of output dropped to its 1999 lowest by only 18 percent. Amazingly, the industry quickly and steadily recovered in the period 1997-2005 to the level of IDR billion 19.292, which is 51 percent higher then the output level just before the economic crisis. So, in term of gross output, the industry has quickly recovered from the economic crisis since expenditure on consumption was one of the main drivers in the economic recovery period in Indonesia. The output growth was also in response to the impact of retail market restructuring in the "post-take-off period" after the removal of restrictions on FDI for retail sector in 1998 (Figure 1).

Even though the sales output of the food industry has grown and exceeded the pre-crisis level, the hardships of the crisis and energy cost rise had caused some divestment. In 1999, as many as 190 establishments (4 percent) went out of business. In the following years (2000-2003) the average number of establishments to go out of

business in the food industry was 63 per year (Table 8). In total, 462 establishments were to go out of business during the crisis (1997-2003). In the period 2003-2005, the recovering industry showed positive growth, with an average of 117 new establishments opening per year. The total number of new business establishments opening since the crisis has been 254. By 2005, the food and beverages industry still had fewer establishments than before the crisis, therefore the output growth mentioned earlier is most likely derived from large businesses.

In the last two decades some multinational companies (such as Nabisco, Heinz, Arnott's, Danone, Campbell, Nutricia etc.) have developed strategic business alliances with local companies. According to the USDA Gain Report (2004), regulation of trade and investment has been revised primarily to accommodate and encourage the greater participation of multinational companies. Import duties on most food products, with the exception of sugar and rice, are five percent.

Table 9: Top ten food companies in Indonesia in 2003.

Ranking	Company name	Category of product	Sales in 2003 (IDR billion, excl. VAT)
1	Indofood Sukses Makmur TBK	Packaged food	7,274
2	Aqua Golden Mississippi (now Danone)	Soft drinks	4,370
3	Nestlé Indonesia	Packaged food	2,922
4	Indomilk	Packaged food	1,861
5	Gunung Slamat	Hot drinks	1,831
6	Coca Cola Amatil Ltd.	Soft drinks	1,752
7	Sinar Sosro	Soft drinks	1,672
8	Santos Jaya Abadi	Hot drinks	1,626
9	Intiboga Sejahtera	Packaged food	1,312
10	Unilever Indonesia Tbk	Packaged food	1,305

Source: Pricewaterhouse Coopers, 2005.

Of the ten top food companies in Indonesia, five are multinational companies (Table 9). These are Danone, Nestlé, Coca Cola, and Unilever. The other five companies are local, producing soft drinks, hot drinks, and packaged food. Indofood Sukses Makmur, the largest food company in Indonesia, is also the largest instant noodle and wheat flour producer in the world. The company runs a vertically-integrated business, from primary production through final processing to market distribution. Its products are distributed through marketing agents, including Indomarco, private

distributors, and several cooperatives. Among the product brands produced by Indofood are: instant noodles (Indomie, Supermie, Sarimi, Sakura), coconut frying oil (Bimoli, Sunrise), margarine (Palmia, Simas), baby products (Promina Sun), food seasoning (Indofood, Piring Lombok), and snacks (Chiki, Chitato, Jet-Z). Indofood also entered a joint venture partnership with the Frito-Lay company (US) in 2004 to set up a potato crisp processing factory.

3.3. Restructuring of the potato supply chain

Indonesia does not import many fresh potatoes for consumption but does import some seed potatoes, including the *Granola* variety (for small-scale processing and fresh consumption) from Germany and the Netherlands, and the *Atlantic* variety (for large-scale processing) from the US and Australia. Processed potatoes are also imported to make French fries for fast-food restaurants. In 1994, imports of potatoes were 8,227 tons; 11 percent was seed potatoes, four percent was for fresh consumption, and 85 percent was imported as processed or preserved potatoes (Table 10). In five years, by 1999, because of a growing demand for fresh potatoes for consumption, the total potato import had double, seed potato import had increased sevenfold and fresh potato imports increased tenfold. In contrast, the import the industrial potatoes (frozen, processed or preserved) stayed the same.

Interestingly, in the five years to 2005, total imports of potato increased even more (threefold) though the further increase in potato demand has shifted toward processed (industrial) potatoes. Imports of frozen potato have double. Starch potato − which had not been imported previously now accounts for 23 percent of total potato imports. (Another kind of processed or preserved potato import also increased six-fold, thus showing the challenge for processors in getting sufficient industrial-type potatoes). Fresh potato imports also increased fourfold. On the other hand, imports of seed potatoes have declined by 50 percent as the result of import restrictions which came into force in 2004 after a seed potato was found to be contaminated by red nematodes. In the course of the local study (which accompanies this meso study) farmers confirmed that it was difficult to find imported seed potatoes after 2004 and most of the seed potatoes used now are produced by a person who propagates them locally.

This amazing increase would have been even greater (driven by the large demand of the fast-food sector which grew quickly over the past decade) had it not been for the local outgrower schemes. Large-scale farmers and farmers' groups grow *Atlantic* variety potatoes for French fries and potato crisps under contract to the large potato processors (the Indofood-Frito-Lay joint venture being the leader) and the fast food chains.

Table 10: Import volume of potatoes 1994-2005.

No.	Imported potatoes	1994		1999		2005	
		Tons	**%**	**Tons**	**%**	**Tons**	**%**
1	Seed potatoes	866	(11)	6,117	(36)	2,808	(4)
2	Fresh potatoes	332	(4)	3,176	(19)	12,450	(18)
3	Industrial potatoes						
	(a). Frozen potatoes	*4,639*		*3,615*		*6,246*	
	(%)	(56)		*(22)*		*(9)*	
	(b). Starch potatoes					*20,466*	
	(%)					*(30)*	
	(c). Other kind of processed or preserved potatoes	*2,390*		*3,857*		*26,863*	
	(%)	(29)		(23)		*(39)*	
	Sub-total of industrial potatoes	7,029	(85)	7,472	(45)	53,574	(78)
	Total imports	**8,227**	(100)	**16,765**	(100)	**68,832**	(100)
	Increase/decrease (%)						
	1994-1999			**104%**			
	1999-2005					**311%**	

Source: Ministry of Agriculture, various years.

Diet change (globalization, or in this case, very specifically "Americanization" of diets) is a key part of the restructuring story. The first part of the diet change was the great increase in potato (a non-traditional product) consumption; Adiyoga (1999) notes that potato consumption was only 0.5 kg/capita in 1968, and had jumped eightfold by 1995 to 4 kg/capita (which was the same in 2004). Therefore the big increase in fresh consumption occurred in the 1970s and 1980s; after that the share of consumption via the processed form increased a lot. In West Java, only one percent of potatoes went into processing in 1995; by 2005, that figure was ten percent. This is part of the overall increase in processed food consumption in the country: consumption of processed foods and beverages increased 30 percent from 1994 to 2005.

The retail and processing 'symbiosis' is a key part of the story. In 1994, potatoes − whether fresh or processed − were nearly all sold via small shops and wet markets but by 2005 most of processed potatoes (and other packaged goods) were being sold via modern retail outlets. While supermarkets accounted for a growing share of food retail (from approximately five percent in 1994to 30 percent in 2005), as is usual in all countries, the penetration was much quicker in processed foods and much slower in fresh foods. The ACNielsen 2007 study shows 52 percent of processed/packaged foods in Jabotabek and Bandung are sold via supermarkets, hypermarkets, and convenience stores. However, the share of fresh potatoes sold via modern retail is

low, less than ten percent. Note also that one finds potato crisps sold in chain convenience stores even in rural towns in Java (competing with traditional snack foods, a cause of concern expressed by the West Java government). Hence the effect of market restructuring is expected to be via a 'chain rule' of retail affecting processing which in turn affects farmers, rather than the (expected slight) effect of retail directly on farmers.

The rise of the large-scale potato processing sector is recent and important to the restructuring story. Small-scale potato processing (of *Granola* variety potatoes) was 'traditional' (not truly traditional in the sense of taking place over many centuries, but a recent tradition in the past half century) and the produce was sold in the production areas. In 1991 the joint venture of Frito-Lay (US) and Indofood changed that, with large-scale production of potato crisps and French fries −the strategic joint venture was in response to an increasing trend of demand for potato crisps in the last decade. Total sales of potato chips were 24,000 tons (or equal to IDR 440 billion) in 2004. The potato crisp product was estimated to represent a 13 percent share of the total snack food market (Chris Rittgers 2004). After the establishment of this joint venture, Indofood-Frito-Lay became a dominant actor in the potato crisps market. Another large company competing in this market is Siantar Top.

This increased potato crisps consumption reflects the diet transformation that takes place when urbanization occurs, whereby the share of processed food consumed increases, and a restructuring (consolidation and multinationalization) of the processing sector takes place. It represents a case of "globalization" of local food tastes through the simple import of an American food form. A restructuring away from small processing firms for local products − dominant before the 1990s − has occurred in the 1990s with the rise to dominance of the large companies like Frito-Lay in joint venture with Indofood. There are few small and medium companies, so one cannot really speak of this sector 'restructuring' over the 1990s and 2000s. The main processing plants for potato crisps and French fries are located near Jabotabek (the greater Jakarta area in Central Java); the main consumption area, and the main production areas, are also on Java (with West and Central Java having 54 percent of the latter) and North Sumatra.

4 Methodology for the study)

4.1. Selection of commodities

Potatoes are a major crop in Indonesia. In production they are ranked second in vegetables in volume terms and first in value terms (439 million USD) in 2005. They are in the top five vegetables sold in supermarkets and wet markets. In 1981, Indonesia produced only 217,000 tons of potatoes, then 813 million tons in 1995 (Adiyoga et al. 1999); this went up 25 percent to 1.010 million tons by 2005. West Java was ranked first (with 30 percent of production) in 1995 (Adiyoga et al, 1999), with Central and Eastern Java and North Sumatra as the other main production zones. West Java is still ranked first, with 39 percent of national production in 2005.

Potato was selected for the micro-level study since it has several marketing options and uses as the result of dynamic market restructuring. In consumption, potatoes are used in a large variety of local dishes, and in the last decade have become popular as French fries, potato crisps and other kinds of snack food. Per capita consumption of potatoes has increased sharply from 0.5 kg in 1968 to 4.0 kg in 1995 (FAO Food Balance Sheets).

The increasing in national consumption is especially significant in the higher income urban classes. Meanwhile, potato consumption in the rural areas is growing at a slower rate. During the last two decades, the number of fast-food restaurants offering French fries to Indonesian consumers has been growing rapidly, especially in big cities. Supermarkets also offer the frozen French fries to their customers. Some processing industries have started operations to produce processed potato products such as potato crisps and potato flour. These processing industries absorb approximately 20 to 40 tons of fresh potato per day (Siregar 1989). Taking into account the increase in demand for exports and processing industries, the resulting demand appears to be strong in the coming years.

4.2. Selection of the study sites

West Java Province, contributing to 39 percent of national potatoes production, was selected as the research area since it includes the most concentrated potato production zones in Indonesia (Table 11). The study focused on major production regions and districts in West Java. There are two major production zones in West Java producing 92 percent of the total potatoes production (Table 12); these are Bandung Regency (62 percent) and Garut regency (30 percent) − the study focused on the two regencies. According to the provincial statistical data, there are 20 districts in Bandung and 20 districts in Garut producing potatoes. We wished to identify the most concentrated potato production zones, since it is hypothesized that the impact

of market restructuring will be the greatest on the most concentrated production zones. Concentrated potato production districts were selected based on the criterion of a minimum of 10,000 ton per year production, assuming farmer's productivity of 10-25 ton per hectares and planting twice a year.

Table 11: Potato production in Indonesia 2001-2006 (tons).

No.	Province	2001	2002	2003	2004	2005	2006	Average	Share (%)
1	N.Aceh Darussalam	6,130	513	28,286	30,333	11,133	13,410	14,968	1.5
2	**North Sumatra**	**207,918**	**220,377**	**235,424**	**153,537**	**105,209**	**98,267**	**170,122**	**17.5**
3	West Sumatra	10,822	8,269	13,889	30,489	33,774	32,378	21,604	2.2
4	Jambi	36,959	38,849	60,896	58,717	59,217	48,356	50,499	5.2
5	South Sumatra	46	17	52	125	567	1,166	329	0.0
6	Bengkulu	3,506	1,752	899	991	884	1,774	1,634	0.2
7	Lampung	661	508	1,234	1,675	1,243	1,675	1,166	0.1
8	**West Java**	**385,618**	**363,327**	**375,167**	**418,230**	**359,891**	**349,158**	**375,232**	**38.6**
9	**Central Java**	**76,926**	**118,056**	**126,222**	**161,213**	**172,740**	**236,695**	**148,642**	**15.3**
10	DI Yogyakarta	206	245	108	64	99	65	131	0.0
11	East Jawa	72,053	84,984	97,308	105,254	86,809	87,928	89,056	9.2
12	Bali	5,129	4,454	4,363	6,515	5,811	5,231	5,251	0.5
13	West Nusa Tenggara	407	325	115	252	307	242	275	0.0
14	East Nusa Tenggara	1,411	2,659	2,123	1,695	1,808	2,301	2,000	0.2
15	Central Kalimantan	-	-	-	-	14	58	12	0.0
16	South Kalimantan	-	-	-	-	-	-	-	0.0
17	East Kalimantan	-	-	-	-	3	-	1	0.0
18	North Sulawesi	12,362	19,880	44,293	86,487	153,269	116,730	72,170	7.4
19	Central Sulawesi	227	375	293	497	177	423	332	0.0
20	South Sulawesi	10,351	28,443	19,169	12,205	12,615	13,405	16,031	1.7
21	South East Sulawesi	144	36	3	-	-	-	31	0.0
22	Gorontalo	-	-	4	4	6	-	2	0.0
23	West Sulawesi	-	-	-	-	-	333	56	0.0
24	Maluku	46	-	131	400	2,159	414	525	0.1
25	Papua	218	755	-	3,105	1,755	1,802	1,273	0.1
26	West Irian Jaya	-	-	-	-	129	100	38	0.0
	Total	833,141	895,826	1,011,982	1,073,792	1,011,624	1,013,917	971,377	100.0

Source: Central Statistical Bureau (BPS), various years.

Table 12: Potato production in West Java province 2001-2005 (tons).

No.	Regency/city	2001	2002	2003	2004	2005	Average	Share (%)
1	Bekasi							
2	Karawang							
3	Purwakarta	6	-				1	0.0
4	Subang	1,380	250	176	311	991	622	0.2
5	Bogor	681	163	552	205	125	345	0.1
6	Sukabumi	1,340	1,427	748	1,184	1,694	1,279	0.3
7	Cianjur	4,374	5,784	2,427	4,109	2,122	3,763	1.0
8	**Bandung**	**292,389**	**227,841**	**223,134**	**261,388**	**209,040**	**242,758**	**62.4**
9	Sumedang	3,922	3,799	3,281	2,254	2,422	3,136	0.8
10	**Garut**	**95,366**	**97,392**	**137,344**	**119,600**	**125,864**	**115,113**	**29.6**
11	Tasikmalaya	141	52	95	110	151	110	0.0
12	Ciamis				505	252	151	0.0
13	Cirebon							
14	Kuningan	1,790	448	533	1,034	2,529	1,267	0.3
15	Majalengka	13,042	26,171	21,775	27,530	14,702	20,644	5.3
16	Indramayu							
17	Bogor City							
18	Sukabumi City							
19	Bandung City							
20	Cirebon City							
21	Bekasi City							
22	Depok City							
23	Tasikmalaya City							
24	Banjar City							
25	Cimahi City							
	Total	414,431	363,327	390,065	418,230	359,892	389,189	

Source: Central Statistical Bureau (BPS), various years.

Based on that benchmark production level per year, there are 15 districts considered as concentrated production zones in Bandung and Garut. Since the production differences among the districts in the two kabupatens vary enormously, the districts were stratified into 3 levels of production zones to constitute more homogeneous groupings:

1. Low production zones (10,000-15,000 tons) = 6 districts.
2. Medium production zones (16,000-40,000 tons) = 5 districts.
3. High production zones (40,000 tons and above) = 4 districts.

From each stratum, 3 districts were selected randomly, therefore nine districts in total were selected: Cisurupan, Pasirjambu and Bayongbong represented the lower production zones; the medium production zones were Pasirwangi, Lembang and Rancabali; and the high production zones were Kertasari, Pangalengan and Cimenyan (Table 13). Each district was visited and its data accuracy was verified in terms of potato planting area (block), production, and list of potato farmers based on

land ownership. From the field verification process, 2 districts were dropped since the production and planting areas reported could not be found and verified in the field; these were Bayongbong district (low production stratum) and Cimenyan district (high production stratum). We found only few farmers planting potato in the last 3 years in those areas. The final 7 districts selected as the study areas are highlighted in Table 14.

Table 13: Potato level of production and classification for the fifteen most concentrated production zones in West Java.

No	District	Regency	Potato production (tons)	Randomly selected
1st strata	*Low production zone (10,000-15,000 tons)*			
1	Bayongbong*	Garut	10,014	✓
2	**Cisurupan**	Garut	11,460	✓
3	Cisarua	Bandung	11,949	
4	Ibun	Bandung	12,547	
5	Pacet	Bandung	14,267	
6	**Pasirjambu**	Bandung	15,439	✓
2nd strata:	*Medium production zone (16,000-40,000 tons)*			
1	Ciwidey	Bandung	16,377	
2	**Rancabali**	Bandung	22,926	✓
3	Cikajang	Garut	32,023	
4	**Pasirwangi**	Garut	32,951	✓
5	**Lembang**	Bandung	34,584	✓
3rd strata	*High production zone (41,000 tons and above)*			
1	Cilengkrang	Bandung	41,115	
2	Cimenyan*	Bandung	269,709	✓
3	**Kertasari**	Bandung	290,320	✓
4	**Pangalengan**	Bandung	1,857,731	✓

Note: * = The district was dropped after a field visitation and verification process.

Table 14: Production and planting area of sampled districts in Garut and Bandung regencies.

No	District	Production (tons)	Planting area (ha)
Garut Regency			
1	Cisurupan	11,460	525
2	Pasirwangi	32,951	2,200
Bandung Regency			
3	Lembang	34,584	200
4	Pangalengan	1,857,731	8,888
5	Pasirjambu	15,439	153
6	Rancabali	22,926	174
7	Kertasari	290,320	970

Source: District Statistical Book, 2006.

4.3. Methods of surveys

From the seven districts selected as the study areas, information for the local-meso study was collected using three methods:

1. Multi-stakeholder participatory rural appraisal (PRA).
2. District Survey.
3. Focus group discussion (focused PRA).

The objective of the multi-stakeholder PRA was to obtain and confirm information from different stakeholders' perspectives about the changes taking place locally in the segments of the food industry under study. During the PRA, participants were given a set of questions to respond to and discuss together to reach a common perception on the issues. The multiple-stakeholder PRA was organized in 3 locations: Lembang, Pangalengan (covering 3 sub-districts in Bandung District), and Garut (covering 4 sub-districts in Garut District) in April to July 2006. The participants invited were a cross-section of farm leaders, farmers' group members, small-scale food processors, food industry managers, food industry suppliers, farm input providers, wholesalers, local small brokers, supermarket specialized/dedicated wholesalers, and other related parties involved in the supply chain in the local zone.

To clarify and further distinguish any differences and developments in each district and among the study area locations, the District Survey was conducted in December 2006 in all districts selected for the micro-level study. The District Survey objective was to collect secondary information at the district level related to population, public facilities, commodities, production and markets. The survey included interviews

with between two and four sub-district officials and local agricultural field officers per sub-district in a focus group discussion.

The third method of information gathering was a focus group PRA conducted in January 2007 in each of the seven districts where the farm samples for the micro-level study were to be selected. The focus group PRA discussions' objectives were: to pursue more deeply the issues and information gathered during the multi-stakeholder PRA and information gathered during the district surveys, and to discuss policy alternatives. Each PRA was conducted separately for two different groups. The first group consisted of between five and eight farmers whose selection was based upon a sociometric mapping (farmers' group leaders, specialized farmers and general farmers) while the second group was the group of traders consisting of four or five traders from the supply chain mapping (broker, wholesaler and supermarket specialized wholesaler).

5 Results of the study: changes in production and marketing systems of key sub-sectors

5.1. Study sites (general local and village information)

The seven districts selected as the study sites are in the key potato zones that have emerged in West Java over the past half decade. Lembang and Pangalengan were the first areas (among those sites) established for commercial potato growing, starting in the late 1980s. Farmers in the Pangalengan area started to cultivate potatoes as a commercial crop in the early 1990s. Today, the Lembang share is only 1.32 percent of overall Bandung Regency potato production and 0.83 percent of West Java potato production; the farmers there have moved on from potatoes to higher value vegetables – climbing the "value ladder". By contrast, today the Pangalengan share of potato production remains high, at 44.42 percent of West Java's overall production, while Garut Regency contributes 29 percent.

For most farmers in Bandung Regency, the potato boom happened during the late 1990s. Pangalengan district farmers have a history of growing potatoes and it is the oldest potato production zone in Indonesia. Several large-scale potato growers in Indonesia originally came from Pangalengan. In the 1990s several potato growers from Pangalengan moved to Garut and started potato cultivation since land was still available there (to be economically profitable, potato needs to be cultivated over a large area to achieve economies of scale). To find a new area for potato cultivation, potato farmers have even travelled to distant locations such as South Sulawesi (Malino), and North Sumatra (Brastagi).

Generally, all districts under the study have good access to roads and markets (Table 15). There is good public transportation operating between two and four times daily in and out of the districts. Though most of the farmers do not own a truck they can easily rent one. Even though districts in Bandung Regency are closer to the national and provincial capital cities, they are only 0.5-1 hour closer to these cities than those in Garut Regency. The distance to the main road, local markets, and local assembly points from each district indicate that the districts in Garut Regency are not at a transport cost disadvantage compared to districts in Bandung Regency. On the other hand, since some districts in Bandung Regency are closer to the cities, and have more urban influence, the population density of districts in Bandung is generally larger than in Garut Regency.

Table 15: Level of accessibility, population, and number of households in the study areas.

No.	Study area	Distance of district to						Population size (# persons)	Number of people in farming households (HH)
		National capital city (km)	Province capital city (km)	Toll road (km)	Nearest main asphalt road (km)	Nearest local market (km)	Nearest collecting point (km)		
Bandung Regency									
1.	Lembang	180	18	14	0.3	0.5	30	145,977	24,619
2.	Pangalengan	180	42	38	0	1	1	129,350	22,175
3.	Pasirjambu	265	45	21	1.2	2	2	73,974	7,772
4.	Rancabali	232	52	46	1.5	7	47	44,577	4,287
5.	Kertasari	220	50	40	2	0.5	0.5	59,217	11,421
Garut Regency									
1.	Cisurupan	258	78	63	0.25	0.3	6	87,462	14,594
2.	Pasirwangi	257	77	60	17	7	16	57,714	10,027
Average									
Bandung Regency		215	41	32	1	2	16	90,619	14,055
Garut Regency		258	78	62	9	4	11	72,588	12,311
Overall		236	59	47	5	3	14	81,604	13,183

Source: District Survey and District Statistical Book, 2006.

5.2. Level of commercialization

To engage in a dynamic and more commercialized market, farmers need to have a supporting environment that facilitates change and transformation, lessens their risk, and thus helps them move away from subsistence farming. The hypothesis is that in the area where the transformation from subsistent to commercial activities is already taking place, farmers will have a greater chance to be included in the modern market supply chain.

The study area was classified into three levels of commercialization: high, medium and low. The commercialization level is measured by two indicators: rural income diversification (into non-farm activities) and crop diversification (into horticulture products). Then, each area was given a score using the indicators and classified into high (score = 4), medium (score = 3) or low (score = 2) commercialization level. Rural incomes in the high commercialized area will be less dependent on the agricultural sector, moving toward rural industry and the service sector. Commercialization of the agriculture system leads to greater market orientation of farm production; so we will find higher percentage of land cultivated for commercial crops. The commercialization indicator is expected to influence the marketing channel choice, but not to have any correlation with potato production.

According to the commercialization level, as shown in Table 16, only two districts (both in Bandung Regency) can be classified as being in the high commercialization zone (Lembang and Pangalengan). Two districts in Bandung and one district in Garut are classified as being in the medium commercialization zone (Rancabali, Kertasari, and Cisurupan). The remaining two districts are classified as being in the low commercialization zone (Pasirwangi and Pasirjambu).

Table 16: Level of commercialization of the study areas.

No.	Criteria and measure	Bandung Regency					Garut Regency	
		Lembang	Pangalengan	Pasirjambu	Rancabali	Kertasari	Cisurupan	Pasirwangi
I	Rural income diversification							
	a. Agriculture (# person)	17,422	22,175	16,383	9868	11,421	24,657	5,438
	b. Agricultural trading (# person)	34	56	1,319	456	856	55	83
	c. Agricultural processing (# person)	2	27	4	2	2	3	32
	d. Non-agriculture (# person)	87,110	26,294	17,442	10,506	8447	7,529	4,875
II	Commodity diversification							
	a. Total area of food crops (ha)	188	573	827	876	703	1,543	1,500
	b. Total area of fruit trees (ha)	3,241	448	304	97	112	97	75
	c. Total area of vegetables (ha)	5,742	9,731	340	812	1,028	2,670	1,371
	Score of commercialization	4	4	2	3	3	3	2
	Level of commercialization*	High	High	Low	Med	Med	Med	Low

Note: * Low=2; Medium=3; High=4.

Source: District Survey and District Statistical Book, 2006.

5.3. Rural income source

The percentage of households that rely on the agriculture sector in the medium and low commercialization zones is still high (65.7 to 72.7 percent, plus two to three percent that rely on agriculture marketing services), and only 25.9 to 32.6 percent of household income in these zones comes from non-agriculture labour (Table 17). These figures show that the areas are still highly dependent on the agricultural sector, including farm labour. Job opportunities in the low and medium commercialization zones are limited, a fact which is also linked to the low quality of human resources. Limited educational facilities, the high cost of education, and low incomes present a challenge to agricultural development, resulting in a poverty trap for farmers in low commercialization zones and most areas with a high dependency on the agriculture sector.

Table 17: Rural income sources.

No.	Production area	Farmers (# person)	Agric. labour (# person)	Agric. marketing (# person)	Agric. processor (# person)	Non-agric. (# person)	Total
High commercialization zone							
1.	Lembang	17,422	3,444	34	2	87,110	108,012
2.	Pangalengan	22,175	15,821	56	27	26,294	64,373
Medium commercialization zone							
1	Rancabali	9868	8,790	456	2	10,506	29,622
2	Kertasari	11,421	8,427	856	2	8,447	29,153
3	Cisurupan	24,657	11,260	55	3	7,529	43,504
Low commercialization zone							
1.	Pasirjambu	16,383	14,569	1,319	4	17,442	49,717
2.	Pasirwangi	5,438	8,384	83	32	4,875	18,812
Average							
High commercialization		19,799	9,633	45	15	56,702	86,193
%		(23.0%)	(11.2%)	(0.1%)	(0.0%)	(65.8%)	
Medium commercialization		15,315	9,492	456	2	8,827	34,093
%		(44.9%)	(27.8%)	(1.3%)	(0.0%)	(25.9%)	
Low commercialization		10,911	11,477	701	18	11,159	34,265
%		(31.8%)	(33.5%)	(2.0%)	(0.1%)	(32.6%)	
Overall		15,338	10,099	408	10	23,172	49,028
%		(31.3%)	(20.6%)	(0.8%)	(0.02%)	(47.3%)	

Source: District Survey and District Statistical Book, 2006.

In contrast, in the high commercialization zone 65.8 percent of households derive their income from non-agricultural sources, less than one percent relies on marketing services, and only 34.2 percent of households still rely on agriculture.

Income in this zone has been more diversified and is moving away from a dependency on agricultural income sources. The agricultural labour force has shifted to non-agricultural jobs, which give higher incomes. Table 17 shows that the high commercialization zones (Lembang, and Pangalengan districts) have the highest number of marketing actors compared to other districts in the sample survey.

The agricultural processor data in Table 17 is mostly related to rice processing. Most vegetable produce is marketed fresh; only a very small amount of it goes to the processing industry. Since the low and medium commercialization zones have many more activities linked to rice cultivation they also have considerably higher number of rice processing units in those areas.

5.4. Cultivated land by commodity group

On average, farmers in the high commercialization zone allocate only eight percent of the total available land for grain, and allocate most of the land for fruit (19 percent) and vegetables (78 percent) (Table 18). Larger land allocation for higher value commodities reflects the commercial orientation of farmers in the area. Lembang and Pangalengan districts have the largest areas of cultivated land dedicated to vegetables growing; they are the oldest main vegetable production areas in West Java. Information from the PRA shows that historically, vegetable cultivation across the whole study area started off with vegetable cultivation by farmers coming from these two districts.

In contrast, farmers in the medium and low commercialization zones allocate larger parts of their land for grain and secondary subsistence crops (39-53 percent) on their dry land, and allocate only four to nine percent for fruit and 39-57 percent for vegetables (Table 18). Since grains are mostly cheaper than fruit and vegetables, these farmers are motivated to cultivate them primarily to fulfil their food security needs (subsistence).

The correlation between a farmer's commercial orientation and his/her percentage of cultivated land allocated for staple food or high value commodity is quite consistent. The higher the commercialization level, the greater the area of land allocated for vegetable cultivation and the less allocated for grain. Land allocation for fruit trees varies somewhat and is not linked to the commercialization level. These fruit trees may be competing with other tree crops, such as wood, tea, or other annual crops.

Table 18: Cultivated agricultural land by commodity group.

No.	Production area	Total cultivated agricultural land (ha)	Total area of food crops (ha)	Total area of fruit trees (ha)	Total area of vegetables (ha)
High commercialization zone					
1.	Lembang	9,171	188	3,241	5,742
2.	Pangalengan	10,752	573	448	9,731
Medium commercialization zone					
1	Rancabali	1,785	876	97	812
2	Kertasari	1,843	703	112	1,028
3	Cisurupan	4,310	1,543	97	2,670
Low commercialization zone					
1.	Pasirjambu	1,471	827	304	340
2	Pasirwangi	2,946	1,500	75	1,371
Average					
High commercialization zone		9,962	381	1,845	7,737
%			(4%)	(19%)	(78%)
Medium commercialization zone		2,646	1,041	102	1,503
%			(39%)	(4%)	(57%)
Low commercialization zone		2,209	1,164	190	856
%			(53%)	(9%)	(39%)
	Overall	4,939	862	712	3,365
	%		(17%)	(14%)	(68%)

Source: District Survey and District Statistical Book, 2006.

5.5. Shift of vegetable commodities cultivated by farmers

The potato was the favoured plant for cultivation by farmers in the 1985—1995 period (Table 19). However, the district survey shows a recent decline in interest in growing potatoes, with farmers shifting to other commodities as substitutes. There were only two districts where the potato was still the main commodity planted by the farmers − Pangalengan (high commercialization zone) and Kertasari (medium commercialization zone).

The main factor causing a decline in interest in farming potatoes was the limited availability of seed potatoes, a result of there being a seed potato import prohibition by the government due to the discovery of a pest in seed potatoes imported from The Netherlands and Australia. The government has implemented a policy of temporary closure of seed potato imports since 2004.

The second reason for a declining interest in potato farming was a drop in production, which was due to a range of factors. The most important factor was declining soil fertility as a result of continuous vegetable planting. In the 1980s, a farmer was allowed to use forest soil (which has the highest level of fertility) for vegetable planting. However, the closure of forest areas for tilling by the community was another reason for the decline in potato planting.

Table 19: Rank of vegetables cultivated by farmers.

Year	High commercialization zone		Medium commercialization zone			Low commercialization zone	
	Lembang	**Pangalengan**	**Rancabali**	**Kertasari**	**Cisurupan**	**Pasirjambu**	**Pasirwangi**
1995	1. Tomato **2. Potato** 3. Cabbage 4. Leafy cabbage 5. Chilli	**1. Potato** 2. Cabbage 3. Tomato 4. Chilli 5. Leafy cabbage	1. Green onion **2. Potato** 3. Cabbage 4. Leafy cabbage 5. Celery	**1. Potato** 2. Carrot 3. Cabbage 4. Green onion 5. Leafy cabbage	1**. Potato** 2. Cabbage 3. Leafy cabbage 4. Chilli 5. Tomato	**1. Potato** 2. String bean 3. Tomato 4. Cabbage 5. Sweet corn	1. **Potato** 2. Cabbage 3. Leafy cabbage 4. Chilli 5. Tomato
2006	1. Tomato 2. Cabbage 3. Cauli-flower 4. Leafy cabbage 5. String beans	**1. Potato** 2. Cabbage 3. Tomato 4. Chilli 5. Leafy cabbage	1. Green onion 2. Celery 3. Cabbage 4. String beans **5. Potato**	**1. Potato** 2. Cabbage 3. Carrot 4. Leafy cabbage 5. Green onion	1. Tomato **2. Potato** 3. Cabbage 4. Chilli 5. Leafy cabbage	1. String beans 2. Tomato **3. Potato** 4. Cabbage 5. Green onion	1. Tomato **2. Potato** 3. Cabbage 4. Chilli 5. Leafy cabbage

Thirdly, the existence of more profitable vegetable commodities creates higher opportunity costs. Tomatoes generally offer the greatest opportunities. The large range of tomato prices (Rp150 to Rp4,500/kg) at farmer level became an attraction in itself for the farmer. At the lowest price for tomatoes, the farmer was sure to suffer a large loss (Rp19,656,000/hectare). At the highest price, however, the farmer could get a much larger profit (Rp206,544,000/hectare[1]. The tomato plant's high level of adaptation, (it is suitable for planting in highland and lowland) was also a reason for the spread of tomato cultivation, which finally became the cause of the large price range. In addition there was an increase in tomato demand as a result of changes in consumers' tomato consumption.

Fourthly, the increasing costs of potato production (Rp19 million – Rp40 million), and the very wide production range (11 tonnes - 27 tonnes/ha which tended to decline), made the farmer turn to other commodities with lower costs. Interest in green beans (low commercialization zone) and celery (high commercialization zone) increased due to these reasons. Lower production costs and still little commodity production made the price offered by the market for these two commodities to be regarded as still better, even though profit was not as large as that of the potato.

On the other hand, in two geographically neighbouring districts (Pangalengan and Kertasari, both in the high commercialization zone), the potato is still the main commodity planted by the farmers. Unwavering interest in potato cultivation in this area is created by factors that supported potato agriculture and which are well established in these areas. Access to other supporting inputs (fertilizers, pesticides) for potato farming in this area tended to be better compared to that of other areas. For example, in Pangalengan there are many local seed potato growers who have obtained certification from BBU/BBI.

Potato farming has become a traditional activity for the farmers in Pangalengan, the largest potato production centre in West Java. The management of potato farming support infrastructure has, therefore, become more developed. Adoption levels for potato farming technology (such as the use of sprinklers, mulch, and support sticks) is higher in this area than in other areas. That is why potato productivity in Pangalengan has been more historically consistent up to the present day compared to other areas.

A more stable price, and the availability of local seed potato production made the potato a relatively less risky commodity. The physical nature of the potato tuber – which allows harvest time to be delayed by a maximum of one month − coupled with the fact that it could be stored for a period of time post-harvest without significant deterioration in quality, means that the farmers have more freedom in awaiting a better potato selling price. If the farmers suffered a loss in the first season, they had at least grown their own seed potatoes which could be used in the next season, so that their farming continuity could be maintained.

5.6. Investment on irrigation and greenhouses

5.6.1 Irrigation

A guaranteed water supply is an absolute requirement for maintaining production continuity and investment in irrigation facilities is one of the efforts farmers can make in meeting the need for water. The proportion of farmer's soil which is covered by an irrigation system could be one of the yardsticks of investments in farming.

On the basis of Table 20, the highest percentage of soil under irrigation is in the areas within the high commercialization zone. An amount of 32 – 36 percent of vegetable soil in the high and medium commercialization zones already has an irrigation system, whereas in the low commercialization zone only 19 percent of vegetable soil has an irrigation system. This is an illustration of the farmers' efforts to increase capacity and ease of getting facilities and infrastructure in supporting their farming efforts.

Table 20: Irrigation system and greenhouse use.

No.	Production area	Cultivated land (ha)	Total area of vegetables (ha)	Irrigation area of vegetables (ha)	Percentage	Farmers using a greenhouse (ha)
High commercialization zone						
1.	Lembang	9,171	5,742	687	12%	150
2.	Pangalengan	10,752	9,731	5,105	52%	0
Medium commercialization zone						
1	Rancabali	1,785	812	385	47%	0
2	Kertasari	1,843	1,028	415	40%	1
3	Cisurupan	4,310	2,670	587	22%	1
Low commercialization zone						
1.	Pasirjambu	1,471	340	26	8%	0
2	Pasirwangi	2,946	1,371	400	29%	0
Average						
High commercialization zone		9,962	7,737	2,896	37%	75
Medium commercialization zone		2,646	1,503	462	31%	1
Low commercialization zone		2,209	856	213	25%	0
Overall		4,611	3,099	1,086	30%	22

Source: District Survey.

The irrigation systems on land under vegetable cultivation were the results of self-supporting efforts by the farming communities within the area. Government-supported irrigation, on the other hand, was focussed more on wet soil food crops (rice fields). The main water source for vegetable land was rainwater, i.e., the farmers collect rainwater as the water source for their land irrigation. Other water sources were the mountain springs and the rivers flowing in the vicinity of farmers' soil. The farmers used various systems of irrigation. Farmers who collected rainwater usually used manual irrigation. Farmers who utilized mountain springs made use of gravity to channel water to their soil using a gully system or using homemade sprinklers. Farmers who utilized rivers as their water source used mostly pumps as their irrigation systems.

The area of irrigated vegetable soil in the Pangalengan district was very large compared to that in other districts, and even compared with the other district in the high commercialization zone (Table 20). Farmers in the Pangalengan district also shared another characteristic − they were more motivated to cultivate vegetable crops with higher commercial value compared to other food crops. This choice was (besides being related to previous history) due to their having access to facilities and infrastructure which were supportive to vegetable crop cultivation.

Pasirwangi, as a district in the low commercialization zone, also had extensively irrigated vegetable soil. This phenomenon illustrates that the farmers of Pasirwangi had already turned to commodities of higher commercial value. The vegetable farmers in Pasirwangi had already started paying attention to market trends, so they made efforts to develop an irrigation system that could support the survival of their farming community.

5.6.2 Greenhouses

Greenhouse ownership in the high and low commercialization zones was in general not much different. All greenhouses in the high commercialization zone could be found in the Lembang district, numbering 150 greenhouses (Table 20). Facilities supporting agricultural development that are abundantly available in the district, as well as good access to large cities, make Lembang a leading vegetable development and research centre in West Java.

The very large number of greenhouses in the Lembang district also indicated the presence of a shift in commodities grown in this area. Due to a general increase in productivity in commonly-grown vegetables, the Lembang district had no comparative advantage anymore with respect to these. Lembang farmers therefore now tend more toward niche market commodities which can yield higher prices. The commodities developed in Lembang that triggered the growth of a large number of greenhouses

various kinds of Japanese vegetables ("exclusive vegetables") and organic vegetables, the development of which needed the application of better technology, controlled environments, and higher levels of farmers' skill. Judging from the supporting facilities and infrastructures in Lembang, the farmers will be well placed to exploit this market opportunity.

The presence of irrigation facilities and greenhouses could become an indicator of the commercial agricultural focus of an area. With the existence of greenhouses one can say that the investment of the district is high, since the commodities produced in greenhouses are commercial commodities − greenhouses are used to maintain quality and increase productivity for the purpose of meeting consumers' demand.

5.7. Production

5.7.1. Level of productivity

Potato productivity levels (yields) per hectare in the research districts were almost equal in magnitude, even though there were differences among the locations (which were, however, insignificant). Average productivity based on data from district field officers was almost identical to the results of the farmer's survey. Average productivity came to 19 – 21 tonnes per hectare. The Lembang district had low potato productivity (18 tonnes per hectare) compared to the other district in the high commercialization area (Pangalengan). The Pasirwangi district, which was in the low commercialization area, also had low productivity (17 tonnes per hectare). Productivity decline, according to the district officer and respondent farmers, was due to the soil quality in Lembang and Pasirwangi, which was known to be deteriorating.

The decline in soil quality in Lembang was caused more by soil saturation which was continuously exploited, in particular for potato crop. Lembang was well known as a pioneer district in terms of the development of potato farming in West Java. This history of potato growing meant that soil quality declined more dramatically compared to other areas, because no efforts had been made to maintain soil quality over the extended period of potato cultivation. In other words, the soil in Lembang had been exploited for a much longer time compared to that of other areas.

Potato production in the high and medium commercialization zones has experienced an increase; this has also been experienced in the low commercialization zone. Total production in the high commercial zone, however, was far greater compared to that in the medium and low commercialization zones. Average potato production in the two districts which belonged to the high commercial zone reached 80,961 tonnes in 2006.

This situation was markedly different from potato production in the two districts which belonged to the low commercialization zone, which reached only 7,265 tonnes (Table 21). Increase in potato production was caused more by the addition of planting area and harvest area in every district − in the high commercialization areas as well as in the low commercialization areas.

Potato production in the Lembang district and Rancabali district (high commercial area) was very low compared to the three other districts in the high commercial area where it was below the production of the district which was in the low commercial area in 2006. The low potato production in Lembang is related to the shift in for the commodities now cultivated by Lembang farmers from potato to other vegetables, because potatoes are deemed not to be profitable anymore. This also happened because of competition with other districts which could produce potatoes of good quality and at higher rates of productivity.

5.7.2. Landholding

From Table 21 it can be seen that the average potato farmer landholding in the commercial area is 1.1 hectare per farmer, which is higher than those of other districts which are in the medium commercialization zone (0.6 hectares per farmer) and low commercialization area (0.7 hectares per farmer) Potato farmer landholding in the Pangalengan district was, on average, far greater still (2 hectares). This is due to the fact that potato is the main commodity grown in Pangalengan, where it might be said that the potato is something of a symbol of the district.

The potato farmers in Pangalengan in particular engaged in expanding their land under potato cultivation, because they were historically reliant upon, the profits from potato growing. This extension of land under potato cultivation was undertaken, for the most part, by renting. It is difficult for the farmers of Pangalengan to buy up land, because almost the whole area is already cultivated by farmers. The high price of land became one of the constraints to land extension, so that the farmers preferred to increase the area on which they grew potatoes by renting instead. On the basis of the results of PRA it would seem that the various efforts made by the farmers for tiller land extension were (1) expansion to other districts the location of which was far from home; (2) utilization of government-owned land and/or that owned by local companies, which could be rented; (3) by way of illegal estate/forest land cultivation (quite possibly a viable alternative).

Table 21: Potato production in 2006.

No.	Production area	Area planted under potato (ha)	Potato production (tons)	% of farmers who are potato growers)	Average land size per grower (ha)	Average yield of potato (ton/ha)
High commercialization zone						
1.	Lembang	33	601	5%	0.2	18
2	Pangalengan	8,066	161,320	60%	2.0	20
Medium commercialization zone						
3.	Rancabali	4	80	5%	0.5	20
4	Kertasari	970	21,340	56%	0.4	22
5.	Cisurupan	525	10,500	60%	0.8	20
Low commercialization zone						
1.	Pasirjambu	89	1,780	10%	0.8	20
2.	Pasirwangi	750	12,750	20%	0.5	17
Average						
High commercialization zone		4,050	80,961	33%	1.1	19
Medium commercialization zone		500	10,640	40%	0.6	21
Low commercialization zone		420	7,265	15%	0.7	19
Overall		1,491	29,767	31%	0.7	20

Source: District Survey.

5.7.3. Number of potato growers

The average percentage of farmers who cultivated potatoes in the high commercialization zone was far greater (33 percent) than in the other two zones; in the low commercialization zone it only came to 15 percent (2006). The percentage of potato farmers in Lembang and Rancabali came only to 5 percent, far below the average percentage of potato farmers in the high commercial area (Table 21). This data presents an increasingly clear picture of the presence of commodity shift engaged in by the farmers in Lembang, from potatoes to other vegetable commodities. As has been explained previously, this shift occurred due to productivity decline and competition with other areas which produce potatoes. The low percentage of the number of potato farmers in Lembang was also due to the change in land use, from farm land to non-farm land. The low percentage of the number of potato farmers in Rancabali was due to limited availability of land suitable for potato farming. The farmers in Rancabali also preferred to engage in cultivating other vegetable commodities (onions, celery, green beans, cabbages, or carrots) which were deemed not to need large capital, were easy to manage, and were sufficiently profitable.

5.7.4. Labour force and wages

Greater commodity diversification in the high commercialization zone made business opportunities in the high commercialization zone more open. This was due to the fact that the volume of labour in the high commercialization zone was 50 percent greater compared to that in the low commercialization zone (see Table 22). In terms of the volume of labour in the high commercialization zone, Table 22 shows that the proportion of the agricultural labour force was very small compared to the non-agricultural labour force. From an average number of 65,000 workers, only 14 percent worked as farm labour in this zone. This is an indicator that there had been a lot of labour transformation from the agricultural sector to the non-agricultural sector in the high commercialization zone. In the low commercialization zone, there was a greater availability of farm labour. Twenty-five percent of the total labour force worked as farm labour.

Table 22: Labour force and wages in 2006.

No.	Production area	Labour force (# person)	Agric. labour (# person)	Agric. labour wage (IDR/day)	
				Male	Female
High commercialization					
1	Lembang	125,298	3,444	15,000	8,000
2	Pangalengan	79,008	15,821	10,000	7,000
Medium commercialization					
1	Rancabali	34,238	8,790	12,000	8,000
2	Kertasari	38,006	8,427	10,000	7,000
3	Cisurupan	48,338	11,260	12,000	8,000
Low commercialization					
1	Pasirjambu	57,667	14,569	10,000	8,000
2	Pasirwangi	28,224	8,384	10,000	8,000
Average					
High commercialization		102,153	9,633	12,500	7,500
Medium commercialization		40,194	9,492	11,333	7,667
Low commercialization		42,946	11,477	10,000	8,000
Overall		58,683	10,099	11,286	7,714

Source: District Survey.

The wage level for agricultural labour has increased in line with economic growth and inflation. In addition, a factor which forced an increase in the level of wages was the hike in the cost of principal necessities over the last 3 years. Whilst the

commercialization zone level influences the wage level, the high commercialization zone wage level differed by only Rp300 from the low commercialization zone wage level. The average male agricultural labour wage in the high commercialization zone was Rp10.521, and in the low commercialization zone it was Rp10.215 per day (from 07.00 to 12.00). For female agricultural labour, the wage for the high commercialization zone was Rp7,869, and in the low commercialization zone it was Rp7,679 for the same working hours.

From these data we can see that the difference in agricultural wage level between the high commercialization zone and the low commercialization zone is not significant. This indicates the extent of level zone characterized by higher economic growth. Other sectors (non-agricultural) were not yet capable of elevating agricultural product values, resulting in the still low level wage of agricultural labour.

5.7.5. Agricultural officials and technical assistants

Table 23 shows that the average number of extension agents in the high commercialization zone was the same as that in the low commercialization zone, (five people). On the basis of PRA results, the role of the extension agency was not felt to be especially beneficial to potato farmers because of the insufficient number of extension agents. The greater part of the extension agents' activities were directed towards food crop commodities, especially rice. Anticipating the insufficient number of extension agents, the local government was providing opportunities for volunteer field technical assistants. Priority was given to local people who had field knowledge and had specific farming expertise, which the local farmers could utilize.

The improvement in extension service performance anticipated in the wake of volunteer field assistants' recruitment was not, however, forthcoming. This was due to the fact that there were only a very few people interested in becoming volunteer field assistants. (To become a volunteer field assistant, the person had to have the confidence of the local farmers and this level of confidence was usually influenced by the person's experience in agriculture.) Currently, vegetable farming technical assistance is chiefly carried out by formulators or field technical officials from private enterprises. The assistance they provide in the field is generally in support of a product sold by the company they represent. Nevertheless, the assistance given by the private companies was deemed to be useful by farmers since they receive more up-to-date information about technology and cultivation techniques this way.

Table 23: Agricultural officials and technical assistants, 2006.

No.	Production area	Agricultural extension agents (# person)	Voluntary and private field tech. assistants (# person)	Tech. assistant activities per year	
				Potato-related technical assistance (# activities)	Agricultural marketing-related assistance (# activities)
High commercialization zone					
1	Lembang	7	2	4	2
2	Pangalengan	3	3	60	27
Medium commercialization zone					
1	Rancabali	4	0	2	2
2	Kertasari	4	2	202	24
3	Cisurupan	6	17	13	13
Low commercialization zone					
1	Pasirjambu	6	4	5	3
2	Pasirwangi	4	25	281	98
Average					
High commercialization zone		5	3	32	15
Medium commercialization zone		5	6	72	13
Low commercialization zone		5	15	143	51
Overall		5	8	81	24

Source: District Survey.

Table 23 shows that the average number of volunteer technical assistants and field officials from private enterprises in the low commercialization zone was 15 people, far greater than the average number of official extension agents (which was five people in each commercialization zone). The number of voluntary technical assistants in the Pasirwangi district (low commercialization zone) and Cisurupan district (medium commercialization zone) was far greater than those of other districts in the above-mentioned two commercial zones. According to the district official this matter was related to the local government (regional) programme to develop local prime commodities, such as the Garut orange citrus fruit − the voluntary technical assistants are tasked with covering all such commodities in the districts. The Garut regency government is making effort to redevelop the Garut orange citrus fruit (Jeruk Garut) commodity, resulting in a great number of the voluntary technical assistant in the two districts of Garut Regency compared to those of Bandung Regency.

Besides the number of extension agents and field technical assistants, Table 23 also gives figures for field technical assistants' activities. The average number of field assistants' activities related to potato farming in the high commercialization zone was

21 for the year, far lower that that in the low commercialization zone, which came to 42 in 2006. This phenomenon occurred because in Pasirwangi district (low commercialization zone) an IPM Field School programme was under way. IPM Field School meetings were held once a week for every farmers' group according to the commodity they cultivated.

Potato-related technical assistant activities in Pangalengan were by far greater (15 times) in 2006 compared to the other district in the high commercialization zone, Lembang. The greater number of potato-related field technical assistants' activities in Pangalengan was due to the fact that potato is the main commodity cultivated there, so that activities were directed towards the potato commodity. On the basis of PRA results, the assistance provided had farmers' group empowerment as its focus . The farmers' group empowerment in question related to organizing the farmers' group towards competitive independency (which was expected to aid the farming process and post-harvest handling), and acting as facilitator in product marketing and provision of market information.

The average number of agricultural marketing-related activities in the high commercialization zone was 14 in 2006, which was somewhat greater than the low commercial area, namely, ten times. Agricultural product marketing-related activities in the Lembang and Rancabali districts (high commercialization zone and medium commercialization zone respectively) were fewer (2 activities each in 2006) compared to those in the other districts in the high and medium commercialization zones. Marketing actors in Lembang were actively involved in seeking information concerning marketing, and interacted directly with farmers concerning their market needs. As a result, with reference to agricultural marketing-related activities, the farmers were more influenced by the marketing actors than by field technical assistants.

The small number of agricultural marketing-related activities in the Rancabali district was the result of a shortfall in field technical assistant manpower in respect of personnel who were competent in marketing. This was due to the fact that Rancabali was partitioned from area so that field assistant man power source was still felt to be inadequate. Another developing issue was that agricultural marketing information in farmers' circles was more likely to be obtained by way of farmers' groups' meetings. On the basis of PRA results, the relatively small number of agricultural marketing assistants' activities evident in Lembang and Rancabali was a result of a field technical assistants' skills shortfall in terms of marketing, coupled with the small number of field technical assistants available.

5.8. Marketing

5.8.1. Marketing actors

On the whole, based on figures given in Table 24, the average number of marketing actors in the high commercialization zone is far greater compared to that in the low commercialization zone. This implies that agricultural commodity marketing activities in the high commercialization zone are also greater in number than in the low commercialization zone. The variety of commodity types in the high commercialization zone also results in a greater number of different agriculture marketing channels.

Table 24: Number of marketing actors and packing houses in 2006.

No.	Production area	Broker/ commissioner (# person)	Local collector (# person)	Whole-saler (# person)	Supermarket spec. wholesaler (# person)	Supplier to food industry (# person)	Packing house (# person)
High commercialization zone							
1	Lembang	50	43	29	10	1	186
2	Pangalengan	80	38	24	1	1	130
Medium commercialization zone							
1	Rancabali	80	14	4	1		1
2	Kertasari	60	30	15	0	0	20
3	Cisurupan	80	40	14	1	0	20
Low commercialization zone							
1	Pasirjambu	50	15	4	0		15
2	Pasirwangi	60	0	18	0	0	12
Average							
High commercialization zone		65	41	27	6	1	158
Medium commercialization zone		73	28	11	1	0	14
Low commercialization zone		55	8	11	0	0	14
Overall		66	26	15	2	0	55

Source: District Survey.

In line with the development of the modern market era, which demanded differentiation in products from the commodities sold to the traditional markets, for the last 10 years there have been some changes in potato farming systems, namely:

1. There was a change in the number of marketing actors.
2. There was a difference in the vegetable requirements of the supplier and industry vendor (however, during its development from the point of supplier as well as vendor there had been no change in requirement since 1995).
3. Prices were rising increasingly steeply. Compared to traditional market prices, the prices to the supermarket as well as to industry were higher.
4. There was an increasing change for the better for farmers to obtain information facilities on marketing.

Prior to the development of the modern market era, the number of marketing actors was limited to the trader in the production zone. For the past 10 years the number of marketing actors has increased: the wholesalers increased in number and the modern market supplier had already existed in the production zones. This represented a development of the marketing chain from producer through to consumer. In 1995 marketing could be grouped into two to five chains. The number of marketing chains then increased in line with the growth of the number of marketing actors, reaching – three to nine chains today (see Figure 3).

5.8.2. Marketing channels

The choice of marketing channel in the high commercialization zone is greater than that in the low commercialization zone. In addition, the number of marketing actors in the high commercialization zone is also greater. In the high commercialization zone in 1996 there were 2 marketing channels − the traditional market channel and the inter-island market (see Figure 3). The traditional market channel absorbed 95 percent of the high commercialization zone farmers' products; 18 percent of potatoes were absorbed by the local market, and 77 percent went to the main wholesale market in Jakarta. Inter-island markets absorbed only a small part of the farmers' potatoes − five percent of the potatoes grown in the high commercialization zone were marketed this way (the majority to Kalimantan and the remainder to Sulawesi).

In the 10-year period to 2006, the number of marketing channels in the high commercialization zone increased with the presence of the modern market channel (the supermarkets and the food industry). In the case of food industry, a change occurred when Indofood started to conduct contract farming with local potato farmers (through vendors) in order to secure supplies of raw material for potato crisps. This change was

initiated by the collaboration of industry and large-scale farmers in Pangalengan (high commercialization zone) in early 2000, and started to spread in 2004 by way of contracts with farmers' groups. A similar process took place in the development of the supply chain to supermarkets: in line with the increasing supermarket demand for fresh vegetables (from the beginning of 2000), supermarket suppliers who were abundant in the high commercialization zone made increasingly large orders for fresh potatoes, even though the quantity was still far from that demanded by the traditional market.

In contrast, in 1996 potato marketing channels in the low commercialization zone were only to traditional markets (Figure 3). One hundred percent of potatoes were absorbed by the traditional market and the wholesale market in Jakarta was the main destination of potato marketing in the low commercialization zone. Ninety-two percent of fresh potatoes entered the wholesale market, whereas eight percent went to the local market. The farmer's choice of where to sell potatoes in the low commercialization zone was very limited. Most of the product was sold to the traditional wholesaler (92 percent), and only few potatoes were sold through a local collector (three percent). Only a small number of potato farmers had direct market access to the wholesale market. From the perspective of market structure, the farmers in the low commercialization zone had weaker positions with respect to their first buyer compared to the farmers in the high commercialization zone, who had a wider market choice.

In the last 10 years the market structure in the low commercialization zone has not changed very much. The change that did come about was only the addition of a market channel to industry but this industrial market channel could absorb less than one percent of the total potato production in the low commercialization zone. The traditional market is the destination for the remaining 99 percent. Industrial potato contract farming in the low commercialization zone takes the same form as that conducted in the high commercialization zone with respect to actors as well as to its contractual arrangements. Contract farming was initiated in 2004 in the low commercialization zone, and started to expand in 2005 (planting season 2005 - 2006). Therefore potato farmers in the low commercialization zone involved in contract farming have only implemented one or two industrial potato plantings.

The main influence on the number of marketing channels in the low commercialization zone compared to the high commercialization zone is the difference in the quantity of potato produced and demanded. For the time being, suppliers to the supermarket are mostly located in the high commercialization zone, resulting in the supply of potatoes to modern the channel still being sourced at places nearest to the supplier location. Better access to markets in the high commercialization zone results in the marketing actors there getting more market information and therefore being more responsive to

incentives offered by the new marketing channel compared to the marketing actors in the low commercialization zone.

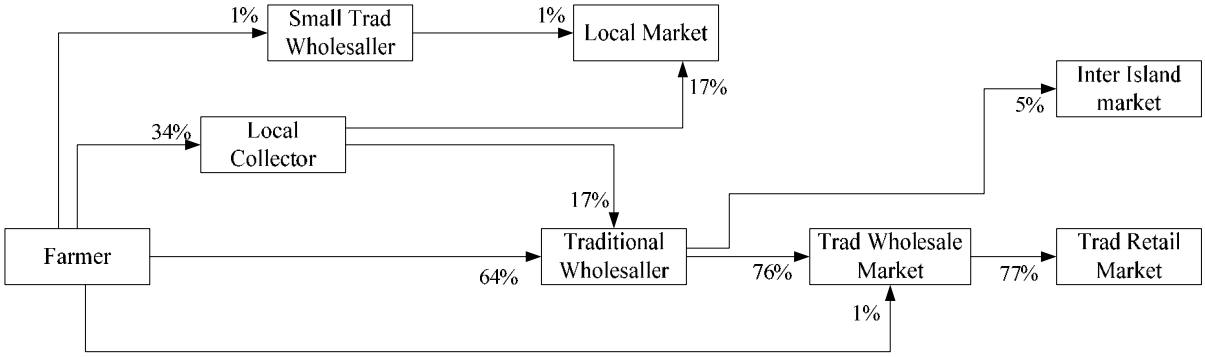
From the perspective of the proportion of potatoes marketed to industry, the industrial potato marketing proportion in the high commercialization zone was greater than that in the low commercialization zone. The better potato production supporting facilities there resulted in the farm-industry contract farming system being duplicated more effectively in the high commercialization zone. A similar pattern emerged with marketing actors. The farmers in the high commercialization zone were also more responsive towards innovations which offered more incentives than the traditional channel, which resulted in a better flow of information to them compared with the farmers in the low commercialization zone.

In addition, the local availability of financing institutions gives the farmers in the high commercialization zone more flexibility in deciding on the commodity they would like to cultivate, and where they would prefer to sell their produce. The financing resources available in the low commercialization zone − which for the most part rely on capital from the wholesaler − constrain the farmer in terms of his/her choice of commodities and marketing channel, which in the end make the farmer more resistant to innovations.

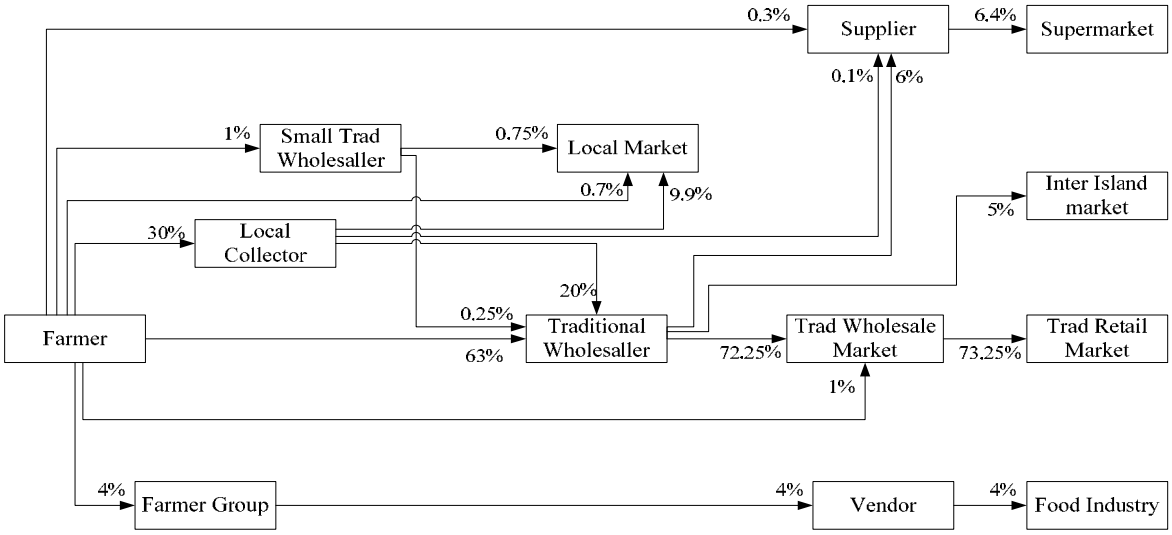
Figure 3: Marketing tree of potatoes in 1996 and 2006.

High commercial zone

1996

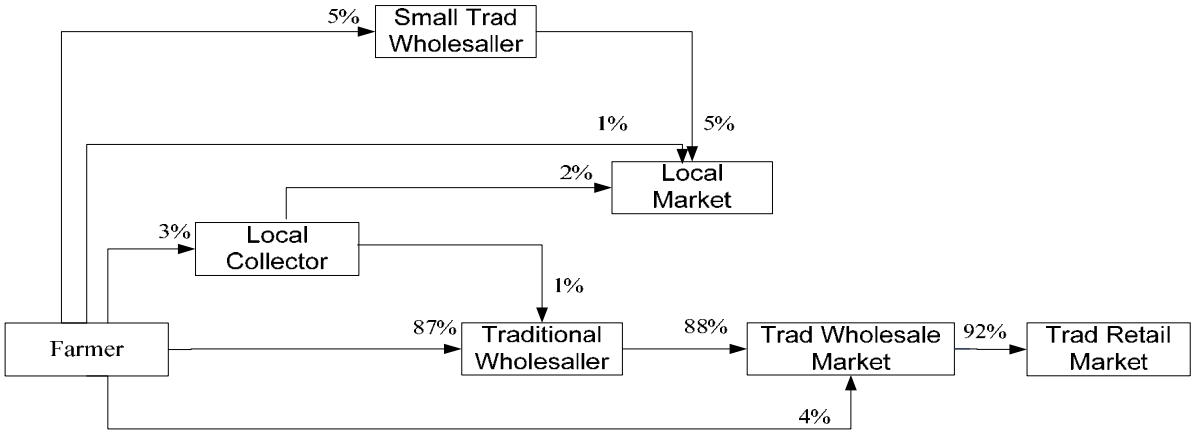


2006

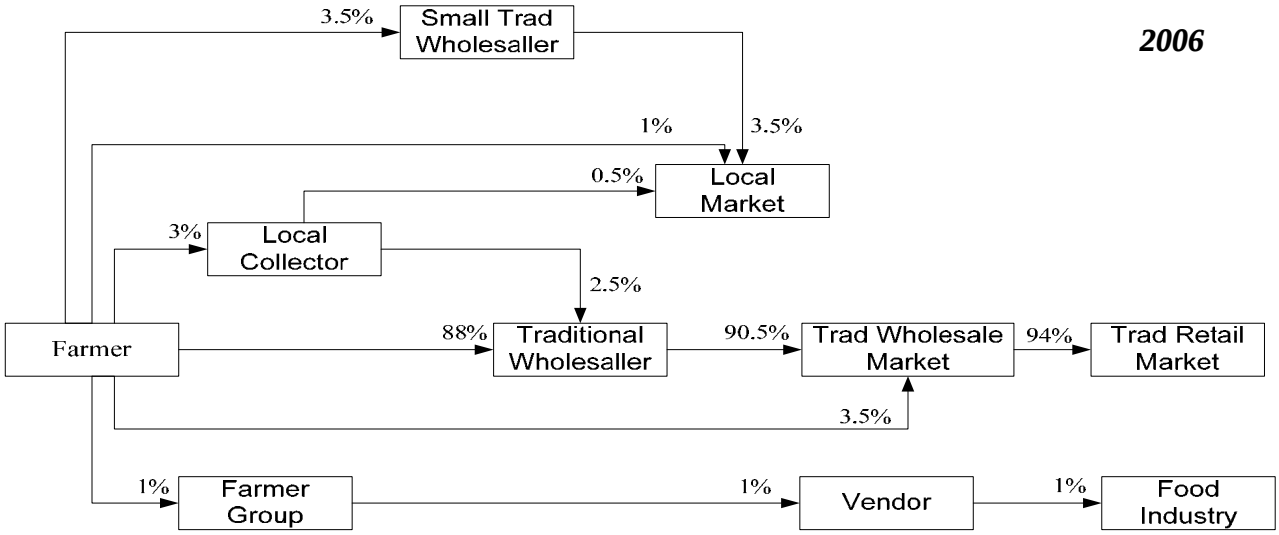


Low commercial zone

1996



2006



Source: Districts PR.

6 Conclusions

The rapid growth of the supermarket sector in Indonesia was triggered by the removal of FDI restrictions in 1998 and was complemented by the growth of the urban population and an increase in investment in property. However, the target consumers of supermarkets, once concentrated into an upper-class income group, are now shifting towards the much larger working-class population.

The FFV share in supermarket sales increased very rapidly in a short time, though a remarkably high proportion of those FFV sales are of imported produce − at least double to triple the imports share in supermarket FFV sales in comparable developing countries. Interestingly, the smaller local chains have the highest share of imports in their FFV sales, and the large chains have a lower share. The cause of the rapid rise and high levels of imports in supermarket FFV sales is the cheaper price and higher quality of these goods. Local farmers are severely constrained and handicapped by extremely poor supply chains caused by poor roads, illegal transportation charges, and the lack of cold chains and other and logistics services.

Even though the marketing of FFV by supermarkets in Indonesia is only in its infancy, the leading chains have moved very early to the use of alternative supply channels to traditional wholesale markets. While major retail chains still source fruit from large-scale importer-wholesalers and large inter-island traders, they increasingly source local vegetables via new-generation specialized wholesalers dedicated to modern market or, for certain products, from grower/packer/shippers using outgrower schemes. The motivation for this early move to new commercial agents outside the traditional wholesale markets is simply that supermarkets find the condition and efficiency of the main wholesale market system to be extremely poor.

The food industry sector development has also reflected retail market restructuring. In 1999, in the middle of the economic crisis, industry sales only dropped by 18 percent and by 2005 gross sales had doubled in real terms. However, the growth in sales within the food industry is enjoyed only by large producers; small and medium producers still struggle to overcome constraints and improve sales.

Demand for potato has been rapidly increasing due to the change in consumer consumption patterns channelled by the demand of modern retailers, and by the Americanization of food chain restaurants and the subsequent food industry demand for raw potato materials for processing. However, domestic potato production has been constrained by limited certified seed potato availability and, worse still, by the restriction on seed potato imports in place since 2004. Because of the demand surge (especially for potato starch, frozen, and processed/preserved potatoes), total potato imports increased eightfold in the decade 1994 to 2005.

While supermarket growth skyrockets and food industry development similarly moves fast, wholesale markets are in a state of stagnation, and the horticultural economies of local areas are hotbeds of dynamic change. Several surprising developments emerge:

Rural West Javan agriculture decades ago was totally dominated by many small brokers. Today, there exist some large, more capitalized wholesalers, supermarket specialized suppliers, industry specialized suppliers, and an important remnant of small brokers.

1. Many farmers are switching out of rice into FFV and adopting irrigation systems, cropping over multiple seasons, and shifting from low-value commodities to intermediate-value products and even into high-value vegetables – climbing a 'value ladder'. Some lead actors are shifting commodity vegetable production to islands where land and labour are cheaper.
2. Potato cultivation was popular among farmers 10 years ago, but because of limited seed potato availability, a decline in productivity, and high production costs, farmers are switching to other higher-value crops.
3. Due to a rapid growth in the land rental market, horticulture farmers are now renting mainly from small-scale rice farmers and large urban speculators. These active renter farmers were rice farmers who started into vegetables a decade ago and then began renting, and then − in the "agricultural ladder" seen in other countries − shifted from renting or sharecropping to land purchase.
4. Despite the horticulture boom and the dynamic development of the wholesale sector, local brokers do not ask for, or allow, farmers to sell their produce graded by different qualities. There is very little incentive to farmers to produce quality fruit and vegetables; the wholesalers sell by grades and capture the profit differences.

In concentrated horticulture zones, an estimated five to six percent of horticulture farmers are starting to participate in sales to the supermarket channels, and one to four percent of them sell to the food industry − mainly via the specialized/dedicated wholesalers and some large wholesalers.

Despite their presence in the rural areas, agricultural extension agents have been of little or no help to farmers in the horticulture boom. Farmers only receive technical assistance from chemical companies' local agents or volunteer field assistants, and nearly all their credit comes from local wholesalers and input suppliers. These farmers have basically no access to other credit sources apart from family, friends, and local lenders.

7 Implications and policy recommendations

7.1. Implications for the micro-level study (Part B)

The micro-level study (Part B of this paper) will primarily focus on potatoes, the 3rd most important vegetable crop in Indonesia. Potatoes are not only important for the modern retail market, but also to the food industry. Unlike the first micro-level study in Indonesia, which determined the sampling frame based upon marketing orientation (supermarket vs non-supermarket), this second micro-level study sample will be drawn randomly from the farming population, regardless of marketing orientation. Hence the determinants of market choice can be tested for all marketing alternatives without suffering from issues of bias. The Part B micro-level study is expected to be able to confirm the impact of market restructuring at the producer market level in the main production zones

Background data on commodity farming for 5-10 years and determinants of commodity choice will be included in the analysis to confirm the indication of the 'value ladder' effect that results in a shift from low-value to high-value commodities. The land ownership and land renting behaviour of each farmer needs to be verified and analyzed further by including complete information on farm landholdings and status historically (for at least the last 10 years).

Information on marketing channel selection for each farmer, by person/actor and by final market destination, needs to be obtained from both sides (from the farmers and also from the buyers/wholesalers). Historical data on marketing patterns also need to be obtained at the district level (kecamatan).

The levels of production zone and commercialization zone; the number of packing house facilities; the number of marketing actors; the farming household's share of income from non-agricultural labour; the area of potato cultivated per farmer; and the presence of a farmers' association, can all possibly be used as interesting IV variables. However, the appropriateness of the IV should be analyzed and tested.

7.2. Policy recommendations for Component 3

The policy recommendations given below together constitute a message that needs to be given weighty consideration in the Component 3 process. The main message that consistently needs to be kept in mind is the importance of communication among actors, and between them and the private self-regulating body. This should be through the development of a private code (rather than by means of public regulation) that

anticipates potential areas of conflict that might develop between supermarket and suppliers, and also within the traditional market system. These efforts also need to be supported by government policy assistance (from local as well as central government) which aims to improve the wholesale market system (including the traditional markets) and increase farmers' capacity.

Indonesia has at present no regulations and institutional systems in place to address in a win-win fashion the possibly mounting conflict and tension between supermarkets and suppliers. Based on the experience of other countries, we suggest that "a private commercial code of practice" may well be the most practical and useful approach in the short-medium run, in that it harnesses private sector interests and can be implemented in situations where commercial laws and institutions are still in the development stage. There would be essentially four components of such a private code (and these tend to be the main elements of most similar regulations elsewhere): compliance with contracts by both retailers and suppliers; equal treatment among suppliers; prompt payment; and cooperation in logistics development. In the medium-longer run, various public regulations and forms of assistance to supply chain actors will be needed to complement this approach.

Moreover, we found a thirst among the farmers, wholesalers, retailers, and input companies to increase communication to resolve difficulties and together address the supply chain and market crisis. There need to be regular fora in the local areas to discuss the issues, problems, and possible policy solutions in the supply chain. Retailers, wholesalers, and farmers alike all emphasized the need to have a neutral but informed entity to facilitate supply chain participant fora, and to increase the quality of technical assistance – and they emphasized the need for the universities to play a far greater role in this regard.

Government support is much needed in strengthening the capacity of farmers and wholesalers to supply supermarket chains. Support is also needed to improve the traditional wholesaler system, thereby increasing competition and market efficiency by creating a greater number of market opportunities. Government support can be given in two ways:

1. Government should undertake measures to promote the 'structural competitiveness' of local actors, which will improve the overall costs of supermarkets and industry procurement and help level the playing field for traditional retailers, wholesalers, and suppliers in dealing with a modernized retail sector. Several measures include:
    - Provision of generic business practice regulations regarding contract and competition, and a reduction of red tape in order to facilitate supplier registration/permits.

- Improvement of wholesale markets and other aspects of commercial enterprise – with a focus on improvement of hygiene and sanitary standards, infrastructure (pavement, roads, buildings and stalls), cold chain systems, and waste management systems. Improvement of wholesale markets such as Caringin, Kramat Jati, Cibitung, Tanggerang will dramatically improve the performance of the whole procurement system.
- Improvement of wet markets and other traditional retail operations, focusing on similar aspects to those mentioned for wholesale markets. Hong Kong implemented this in the 1990s and created chain reactions of improvements in the wider market system. It is important that the traditional retailers be helped to compete with supermarkets, as the wet markets are not only a place to shop but also places where millions of people earn a living. Wet markets should exist in harmonious competition with the supermarket sector. This will facilitate a more efficient link to the modern procurement system through better relations with processors and packers.

2. Government should undertake measures to develop 'customized competitiveness' by supporting those suppliers with the capacity to supply supermarkets. In this case the government can give public assistance as follows:
   - Provide market intelligence to the supply chain and facilitate business linkages between farmers, wholesalers, supermarkets and industry. This includes business meetings, exhibitions, and business visit programmes that create business linkages and alliances. The PRA participants emphasized the need for this at the local, regional and national levels. Ideally, if extension service facilities like BIPP and BPP that are available in every region can arrange such meetings regularly, this would supply the connection that many of our respondents felt was missing. Of course, the existing extension service agents would need to have a capacity-building training course first before arranging such a programme.
   - Facilitate development of farmers' groups, growers' associations, and new-generation cooperatives that can effectively bulk product and monitor quality (and eventually market graded products). There have been many government programmes to develop farmers' groups, associations or cooperatives but only for the purpose of delivering government subsidy or support, so these are not sustainable − the groups dissolve when the support or subsidy programmes end. There has to be a major re-orientation of the organization development programme. The programme has to start with an evaluation of farmers' needs and/or objectives and not with subsidy or support.

- Develop public standards for FFV products, to form a common foundation for the parties in the supply chain so that successful farmers and suppliers can upgrade themselves to the modern supply chain.
- Create greater accessibility for farmers and wholesalers to financial services. The payments of supermarket to suppliers are made generally with a time lag. The government can facilitate 'factoring' services via agreements between retail and banking.

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Regoverning Markets

Regoverning Markets is a multi-partner collaborative research programme analysing the growing concentration in the processing and retail sectors of national and regional agrifood systems and its impacts on rural livelihoods and communities in middle- and low-income countries. The aim of the programme is to provide strategic advice and guidance to the public sector, agrifood chain actors, civil society organizations and development agencies on approaches that can anticipate and manage the impacts of the dynamic changes in local and regional markets. The programme is funded by the UK Department for International Development (DFID), the International Development Research Centre (IDRC), ICCO, Cordaid, the Canadian International Development Agency (CIDA), and the US Agency for International Development (USAID).

Agrifood Sector Studies

These studies look at specific agrifood sectors within a country or region. Research studies have been carried out in China, India, Indonesia, Mexico, South Africa, Turkey, Poland and Zambia covering the horticulture, dairy and meat sectors.
Part A describes the observed market restructuring along the chains.
Part B explores the determinants of small-scale farmer inclusion in emerging modern markets. Using quantitative survey techniques, they explore the impacts on marketing choices of farmers, and implications for rural development.

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