Growth in high-value agriculture in Asia and the emergence of vertical links with farmers

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Introduction[5]

Throughout the developing world, the relative importance of grains and other starchy staple crops is declining, while that of high-value agricultural commodities is increasing. This transformation of the agricultural sector has profound effects on the nature of agricultural supply channels, the opportunities for small farmers, and the role of public policy and investment. In particular, the growth in high-value agriculture implies a greater need for close linkages between farmers, processors, traders, and retailers to coordinate supply and demand.

The growth of high-value agriculture, the development of institutions for vertical coordination, and other structural changes in agricultural supply channels present both opportunities and challenges for small farmers in developing countries. They create opportunities for small farmers to raise their income by participating in the growing markets for high-value agricultural commodities. At the same time, the changes pose challenges to small farmers because high-value agricultural commodities often involve higher costs of production and greater production and marketing risk. Vertical linkages between farmers and buyers can help overcome these obstacles, but in some cases buyers decide small farmers cannot satisfy new demands from consumers for quality and food safety, leading to the exclusion of these farmers

[5] This chapter is a shortened and revised version of Gulati et al, 2005, which contains more detailed description and documentation of the trends described here.

from supply chains. These trends raise new issues for policymakers who wish to promote pro-poor agricultural growth.

The objective of this paper is to describe the growth of high-value agriculture, its direct implications for the restructuring of the agricultural supply chain, and its indirect implications for the role of small farmers. We focus on three countries in South Asia (India, Bangladesh, and Pakistan), four countries in Southeast Asia (Thailand, Vietnam, Indonesia, and the Philippines), and China.

Factors behind the growth of high-value agriculture

What is causing the growth in high-value agriculture in developing countries? On the one hand, there is a growing domestic demand for high-value food commodities, driven by rising incomes, urbanization, and perhaps changing preferences. At the same time, trade liberalization has opened export markets in other countries where high-income consumers demand fruits, vegetables, animal products, and fish. And finally, market reforms have (to varying degrees) allowed more foreign direct investment in developing countries, introducing more competition in food processing and retailing sectors, as well as allowing foreign companies to organize production for export.

Income growth is a key factor in the rising demand for high-value agricultural goods because, being relatively expensive sources of calories, these products generally have high income elasticities. Thus, rapid economic growth in Asia has stimulated domestic demand for high-value agricultural products. China and Vietnam experienced the most rapid rates of per capita GDP growth over the period 1990-2002, 8.6 percent and 5.7 percent, respectively. Bangladesh, India, and Thailand achieved healthy growth rates of more than 3 percent per year.

Average per capita growth rates in Pakistan and the Philippines were the lowest, hovering around 1 percent per year (World Bank, 2005).

Demographic factors also affect the growth of high-value agriculture. The percentage of the population living in urban areas has increased over the period 1980-2002 in all eight of the Asian countries under consideration. Several studies indicate that urban and rural household food consumption habits differ, even after holding income and other household characteristics constant. Urbanization is associated with lower rice demand in India, Bangladesh, Pakistan, Indonesia, and Thailand (Huang and David, 1983). In Vietnam urban household spend more on meat, fish, and sugar and less on rice than rural households, even after controlling for income and household characteristics (Minot et al, 2003). These differences are probably related to the fact that, in urban areas, the variety of food available is greater and the opportunity cost of time of household members is higher.

Outward-looking trade policies also contribute to the growth of high-value agriculture.. The lowering of import barriers in developed countries has facilitated the growth of high-value exports such as fish and seafood products. Developing countries themselves have reduced import tariffs and moved toward market-oriented exchange rates, which increase the incentives to export. Since high-value agricultural commodities and processed foods represent a larger share of the food budget of high-income consumers, it is natural that, as farmers in developing countries shift from meeting domestic demand to meeting international demand, they also shift production from staple crops toward high-value agricultural commodities. It should be mentioned, however, that trade liberalization is a two-edged sword when it comes to high-value agriculture. In some cases, trade liberalization makes local farmers more exposed to competition from imported high-value agricultural commodities.

Seven of the eight Asian countries under consideration have reduced the mean import tariff by more than one half over the 1990s (Vietnam was the exception). The value of agricultural trade as a percentage of agricultural GDP significantily increased between 1990 and 2002 in six of the eight countries (World Bank, 2005).

Another factor which has stimulated the transformation of agricultural production toward high-value agriculture is foreign direct investment (FDI). Net FDI flows have increased dramatically in some countries, but the trends are erratic due to the 1997 Asian financial crisis. The most dramatic rise in FDI is in China and India, where it has increased more than ten-fold since the early 1990s. Similarly, FDI in Vietnam has grown almost ten-fold over this period. FDI inflows in Bangladesh, Pakistan, and the Philippines are at least twice as large as in the early 1990s. Foreign investment is usually focused on food processing, animal feed, exporting, and (more recently) food retailing. The entrance of foreign companies into the agricultural sector puts competitive pressure on local agribusiness companies, but it has the potential of reducing margins through competition and/or creating new markets, which generally creates new opportunities for farmers (see Gulati et al, 2005 for more detail).

Foreign direct investment can promotes the growth of high-value agriculture in one of three ways. First, FDI in the export sector may serve to link farmers in developing countries with high-value export markets, particularly those in the home country of the company. This is particularly relevant in the case of the export of fresh produce and fish, where foreign-market expertise is required to meet food safety and quality standards. Second, FDI in the processing sector may create a new market for high-value agricultural commodities by preserving perishable goods and supplying the processed item to high-income markets. Third, to the extent that foreign companies use their expertise and scale of operations to reduce marketing margins in the

processing and/or retail sector, they may reduce the price and increase the domestic demand for high-value agricultural commodities.

Shift in composition of food demand

How are factors listed above affecting the composition of food demand in Asia? One clear trend is that rising incomes are reducing the share of household budgets allocated to food. Three specific patterns can be observed from household surveys data from various countries[6]. First, the food share is substantially higher in rural areas than in urban areas. This is consistent with Engel's Law and the fact that urban incomes are higher than rural incomes. Second, the food share is declining both in urban and rural areas in each country, the only exception being the urban areas of Indonesia where the food share increased slightly between 1990 and 2002. This is presumably the result of the Asian financial crisis of 1997-98 which reduced urban incomes more than rural incomes. Third, the decline in food shares was particularly rapid in Vietnam, where it dropped 13 percentage points in five years, and in China. This is consistent with the fact that China and Vietnam experienced the fastest economic growth rates among the eight countries under consideration (World Bank, 2005).

At the same time, the composition of food budgets is changing (see table 1). In particular, as incomes rise, there is a shift from grains and other starchy staple crops (such as cassava and sweet potatoes) to meat, milk, eggs, fish, fruits, and vegetables. In most of the eight countries considered here, per capita grain consumption increased very slowly (Bangladesh, the Philippines, and Thailand) or decreased slightly (China, India, and Pakistan). In contrast, per

[6] For Bangladesh, Report of the Household Income and Expenditure Survey, 2000. For India, National Sample Survey Organization, India. For Pakistan, Household Integrated Economic Survey, 1998-99 and 2001-02. For Indonesia, Central Bureau of Statistics. For Vietnam, the Vietnam Living Standards Survey 1993 and 1998 (GSO, 1998 and 2001). For China, National Bureau of Statistics, China Statistical Yearbook, various years.

capita vegetable demand grew fairly quickly (above 2 percent per year) in five of the eight countries and above 4 percent in two countries (Vietnam and China). Fruit demand appears to have grown somewhat more slowly, but the growth rate still exceeded that of grains in seven of the eight countries. Milk demand experienced some of the highest annual growth rates: 13 percent in Vietnam and 5-6 percent in Indonesia, Thailand, and China. Per capita demand for meat grew very rapidly (over 4 percent annually) in China, the Philippines and Vietnam and more modestly in Thailand, Bangladesh, and India. Similarly, the growth in demand for fish and seafood was over 3 percent per year in five of the eight countries under consideration.

Table 1. Average changes in per capita consumption of selected foods (annual percentage growth rate over 1990-2000)

	Bangladesh	India	Pakistan	Indonesia	Philippines	Thailand	Vietnam	China
Cereals	0.2%	-0.4%	0.0%	0.9%	0.1%	0.2%	1.2%	-1.3%
Vegetables	0.1%	2.1%	2.2%	3.3%	0.0%	0.5%	4.9%	8.5%
Fruit	-1.5%	2.9%	0.5%	1.9%	0.2%	0.3%	1.7%	10.0%
Milk	0.2%	1.9%	3.0%	5.9%	1.5%	5.0%	13.5%	5.0%
Meat	1.0%	0.9%	0.2%	0.4%	4.7%	1.5%	4.3%	6.8%
Eggs	4.6%	1.9%	1.9%	3.7%	1.6%	-0.4%	5.8%	9.7%
Fish	4.7%	2.0%	1.6%	3.2%	-1.4%	3.9%	3.7%	8.4%

Source: FAO Food Balance Database.

Another aspect of the shift toward higher-value food is the growing demand for prepared or semi-prepared foods. Among urban households, particularly higher-income households, there is a trend toward ready-to-cook and ready-to-eat foods, including pre-cut vegetables, de-boned meat, and filleted fish. Food consumed outside the household at restaurants, fast-food establishments, and street stalls is another trend in urban areas. As income rise and women join the work force, the opportunity cost of the time spent cooking and shopping rises, making these choices more attractive.

The opportunities faced by farmers in developing countries are increasingly affected not just by the composition of domestic demand but by that of export demand. As shown in table 2, the growth in agricultural and fishery exports in the eight countries has been substantial: 4.8 percent per year over 1990-2000. But the export demand for high-value agricultural commodities has increased even more rapidly. By far the largest category of high-value agricultural exports is fishery products. Fish and seafood exports from these eight countries grew from US$ 8.8 billion to US$ 17 billion, representing an annual growth rate of 6.9 percent. In seven of the eight countries, the growth rate was over 4 percent per year. Five of these countries (China, Thailand, India, Indonesia, and Vietnam) now export more than US$ 1 billion per year in fish and seafood products. Fruit and vegetables are the second largest category of high-value agricultural exports. The total value of fruit and vegetable exports from the eight countries grew at 5.6 percent per year over 1990-2000, surpassing US$ 5 billion. Furthermore, these exports increased by more than 4.8 percent per year in every country except Bangladesh. India and Vietnam experienced annual export growth rates of over 9 percent.

Table 2. Average changes in exports of selected foods (annual percentage growth rate over 1990-2000)

	Bangladesh	India	Pakistan	Indonesia	Philippines	Thailand	Vietnam	China
Agric products (incl fishery)	3.7%	6.1%	1.5%	6.8%	2.0%	4.2%	16.2%	3.4%
Fruits & veget.	2.3%	9.2%	7.7%	8.1%	4.9%	4.9%	9.8%	5.3%
Dairy and eggs	-	33.1%	-	16.3%	46.6%	5.9%	0.3%	4.0%
Meat products	-35.2%	15.2%	23.3%	-	6.0%	9.5%	15.4%	-1.6%
Fishery products	8.3%	12.2%	4.8%	5.1%	1.5%	6.8%	24.9%	5.2%
High-value agricultural exports as a percentage of agricultural exports								
1990	56%	21%	15%	41%	49%	49%	30%	57%
2000	81%	36%	23%	36%	56%	62%	51%	61%

Source: FAO Agricultural Trade Database.

Note: For the purpose of this table, fruits and vegetables are defined more narrowly that the FAO category, as we exclude sugar crops, pulses, and starch root crops such as cassava and sweet potato. The agricultural exports are defined broadly to include the sum of agricultural exports, as defined by the FAO, and fishery product exports.

The share of high-value agricultural exports in total agricultural exports increased substantially over the 1990s in seven of the eight countries. For the eight countries as a whole, high-value agricultural exports increased from 47 to 53 percent of the total.

Growth in production of high-value agricultural commodities

In response to the growth in domestic consumption and, to a lesser degree, export opportunities, production of high-value agricultural commodities has grown more quickly than that of traditional grain crops (table 3). Grain production in the eight countries under consideration grew about 1.3 percent per year in volume over the 1990s. This rate is slightly below the annual rate of population growth for the eight countries (1.5 percent).

By contrast, the production of high-value agricultural commodities has grown rapidly in many countries. Fruit and vegetable production in the eight countries has grown 7.7 percent per year in volume over the 1990s. China represents a large and growing share of Asian fruit and vegetable output. It grew over 10 percent per year over the 1990s, reaching about two-thirds of the output of the eight countries combined. But fruit and vegetable production growth is not limited to China; it grew at more than 3 percent per year in India, Pakistan, Indonesia, and Vietnam as well. Milk production has grown at 4.6 percent annually in the eight countries under consideration. India, Pakistan, and China are the dominant producers in the region, and all three have production growth rates above 4 percent per year. Thailand is a minor producer but output grew at almost 15 percent annually over the 1990s. In addition, the production of eggs, meat, and fishery products in the eight countries grew at more than 6 percent per year (FAO, 2005).

Table 3. Growth in production of grains and high-value agricultural commodities (average annual growth over 1990-2000)

	Bangladesh	India	Pakistan	Indonesia	Philippines	Thailand	Vietnam	China
Grains	3.6%	1.9%	3.8%	1.7%	1.4%	3.7%	5.7%	0.1%
Fruits & Veg	1.7%	4.3%	3.8%	4.1%	2.1%	2.1%	4.7%	10.2%
Milk	3.0%	4.2%	5.7%	2.8%	-6.5%	14.8%	3.5%	5.8%
Eggs	6.4%	4.2%	4.6%	4.9%	3.4%	1.1%	6.7%	10.8%
Meat	3.4%	3.0%	2.8%	1.6%	5.6%	3.6%	6.3%	7.6%
Fishery	7.0%	4.0%	2.7%	5.0%	0.4%	3.0%	7.6%	11.3%

Source: FAO Agricultural Production Database and Fishery Production Database.

In general, the growth in domestic demand for food is much more important than export demand in stimulating the growth in output of high-value agricultural commodities. For example, in China, fishery exports doubled over the 1990s, but this increase represents just 8 percent of the total increase in production over the decade. The vast majority of the increase in production was to serve the growing domestic demand.

Consolidation and vertical coordination in food marketing

Growth in consumption and production of high-value agriculture commodities in Asia has been accompanied by changes in the food supply chains linking the two. Changing consumption patterns towards perishable high-value products imply changes in the characteristics of the products demanded, in addition to increases in quantities demanded. Product attributes such as food safety, convenience, and perceived organoleptic qualities become more important and are associated with price premia. The new demands require changes in marketing infrastructure such as cold chains, and better management of market information along the chain to deal with the risk of product spoilage before final sale. New forms of retail chain and large-format stores such as supermarkets and their associated procurement and

distribution infrastructure have risen to fill these needs. The entry of private players from outside the traditional food retailing sector and foreign direct investment by existing globalized supermarket chains have also facilitated the consolidation of Asian retail chains in response to new consumer demand.

The changes are most evident for the most perishable commodities with the highest income elasticities, such as fish, meat, eggs, and milk, but are also increasingly affecting higher value fruits and vegetables. These changes have implications—both positive and negative—for the traditional smallholder farmers that still constitute the bulk of Asia's population. Understanding how these changes affect the rural and urban poor requires working backward from change in urban demand.

Consolidation and growth in the retail food sector

Supermarkets and other modern retail food stores[7] have grown rapidly in Asia. In 1990, China had one supermarket. By 2002, there were 53,000 supermarkets and convenience stores (Hu et al, 2004). In Thailand, annual growth in the number of modern food outlets was 11 percent in 2001-2002 (USDA, 2002). In the Philippines, the number of supermarkets has increased from 496 in 1994 to 3989 in 2001, a 30 percent annual growth (Digal and Concepcion, 2004). In Bangladesh, there are 30 supermarkets today, all of which opened since 1999 (USDA, 2004). Indonesia has seen the number of supermarkets and hypermarkets grow from 237 in 1989 to 1400 in 2002, though much of this growth occurred before the Asian financial crisis of 1997-98 (Chowdhury et al, 2004).

[7] For convenience, we defined supermarkets broadly to include hypermarkets, convenience stores, and other modern retail outlets, although definitions vary from one country to another.

The importance of supermarkets and hypermarkets in the total value of retail food sales varies widely across Asian countries. In Thailand and the Philippines, supermarkets and hypermarkets accounted for over half of retail food sales (USDA, 2002; Digal and Concepcion, 2004). This is consistent with the fact that Thailand and the Philippines have the highest income of the eight countries considered here. In Indonesia, these modern retail outlets are estimated to represent 25 percent of retail food sales. In contrast, the share is about 10 percent in Pakistan, less than 5 percent in India and Bangladesh, and 30 percent of *urban* food sales in China (see Table 4).

Initially, supermarkets tend to be located only in the largest cities, catering to high-income consumers. This is currently the case in Pakistan, Bangladesh, and Vietnam. As the number of supermarkets and their market share increases, they spread to secondary cities and towns, as they have in Thailand and are beginning to do in China. As part of this process, supermarkets also begin to cater to middle- and lower-income urban consumers, although it is likely that supermarket customers still have incomes above the national average (Chowdhury et al, 2004; USDA, 2002).

Table 4. Structure of the retail food sector

Country	Year	Number of super-markets	Share of super-markets in total food sales (%)	Growth in supermarket outlets (%)		Source of information
				Period	Annual growth rate	
Bangladesh	2004	30	1%	1999-2004	97%	USDA, 2004
India	2000		2%	2003-2008	24-49%	Chengappa, forthcoming
Pakistan	2000	800	10%			SDPI, 2004
		1307			15%	Chowdhury et al, 2004; USDA,
Indonesia	2003		25%	1989-2002		2003
Philippines	1995	3989	68%	1994-2001	30%	Digal and Concepcion, 2004
Thailand	2004	600	54%	2001-2002	11%	USDA, 2002
Vietnam	2003	<70	<2%			Tam, 2004
China	2003	37,000	30%(urban)	1995-2002	36%	Hu et al, 2004

Note: Supermarkets are defined to include convenience stores, hypermarkets, department stores, and large discount stores, though definitions vary from country to country. The India growth rate refers to a projection by EuroMonitor. Growth in supermarket sales is generally greater than growth in the number outlets since the average size tends to increase over time.

Causes of the retail food restructuring

The rise of supermarkets in Asia (as elsewhere) is partly driven by rising per capita income. The importance of supermarkets is greater in higher income countries such as Thailand and the Philippines than in Vietnam or Bangladesh. Furthermore, the growth in supermarkets seems to be related to economic growth, both being highest in China. Finally, supermarket expansion slowed in Indonesia following the Asian financial crisis, as consumers returned to traditional markets during the crisis (USDA, 2002; Chowdhury et al, 2004). Although incomes are lower in the Philippines than in Thailand, the share of supermarkets in retail food sales is similar, perhaps due to the higher level of urbanization in the Philippines.

Liberalization of foreign direct investment has contributed to the growth of supermarkets. The growth of supermarkets in China began in the early 1990s, but took off after 1995 when rules on foreign investment were relaxed. In Thailand, seven of the ten largest chains have foreign investment. In Indonesia, foreign investment regulations were liberalized in 1998, and the share of supermarkets in food retail sales rose from 6 percent in 1997 to 20 percent in 2001 (Chowdhury et al, 2004). India has relatively tight regulations on foreign investment in the retail food sector. Although supermarket chains are growing, particularly in the south, the organized food retail sector still accounts for less than 10 percent of food sales. In Pakistan, there is no foreign investment in food retailing. In 1998, the sector was dominated by Utility Stores Corporation, a state-owned enterprise with 715 stores. About half have since been closed in an attempt to reduce losses (SDPI, 2004).

Perhaps unique among Asian countries, China is using various policy instruments to accelerate the transition from traditional stores and wet markets to supermarkets in order to address food safety concerns and enhance tax collection (Bi et al, 2004)

Consequences of retail food consolidation

One consequence of the growth of supermarkets in Asia is increasing competitive pressure on traditional retail outlets. For example, in Thailand, the total number of modern outlets grew at a rate of 10.6 percent from 2001-2002 while traditional outlets declined by 14.9 percent in the same period. In Indonesia, hypermarkets grew at a rate of 20 percent in 2002 while independent grocers grew at 8.5 percent (USDA, 2002, 2003).

Another consequence of the growth of supermarkets is change in the procurement channels, especially for fresh high-value products. Small chains and independent supermarkets often procure from wholesalers and wet markets. But when supermarket chains reach a certain size, they generally establish centralized food distribution centers that supply all stores in the chain. This vertical integration into wholesaling operations allows them to standardize quality, improve bargaining power, and achieve economies of scale in distribution. In addition, they usually adopt a list of preferred suppliers who are known to be able to produce consistently the quantity and quality demanded by the supermarket chain. The need to standardize quality (particularly if the chain offers store brands) leads to the development of detailed private standards, most importantly for fresh fruits and vegetables, meat, and fish. The procurement system is more demanding than the ones used traditionally by wholesalers and retailers. Thus, the trend has been to move towards contracts with dedicated suppliers to reduce the transaction

costs of bargaining as well as reducing risks, wastage and guaranteeing food safety and quality control (see Hu et al, 2004; Chowdhury et al, 2004; and Digal and Concepcion, 2004).

Supermarkets have started setting food standards, moving away from informal standards to formalized private standards based on quality and food safety. This is partly a response to consumer demand and partly a reaction to the lack of success of public standards. In some countries, there are public standards, but where foreign companies have entered the supply chain, the standards become more stringent.

Food processing consolidation

The food processing industry in most countries reflects the changes in income and consumption patterns. As discussed earlier, when income rises, the share of food expenditure declines and consumption patterns change from staples to high-value food commodities. In addition, higher-income households tend to buy more processed food and pay more attention to food safety issues and prefer to buy branded, labeled, and packaged products whose quality they can trust.

The development of the food processing sector assumes significant importance due to the growth of high-value products. The seasonality and perishability of high-value products demand that these products be processed as swiftly as possible as storage for a long period is not possible and processing can avoid wastage and shrinkage. Thus, the emerging trend of demand-driven growth in high-value agriculture has to be accompanied side-by-side by the development of the food processing sector.

Value added in the food processing sector in the selected Asian countries has grown at about 9 percent per year since 1990[8]. China, India, and Bangladesh have smaller food processing sectors (relative to the economy as a whole) than Indonesia, Thailand, and the Philippines, as would be expected given the income levels of these countries. At the same time, China, India, and Bangladesh have the fastest growing food processing sectors, a pattern consistent with a shift of food processing capacity from higher-wage economies to lower-wage economies within Asia. In addition, the economies of China, India, and Bangladesh were generally more tightly regulated in the 1990, and the degree of economic reform, including deregulation of foreign direct investment, may have been greater in these countries since 1990s.

Furthermore, processed food exports have been growing faster than primary and agricultural product exports in all countries studied. Bangladesh, Indonesia and Thailand have exhibited annual growth rate of 15 percent or more. There seems to be a positive correlation between high income growth and exports of processed food. In spite of being the poorest country among the ones studied, Bangladesh has performed better than most countries, largely due to fishery product exports, which are processed.

Emerging forms of farmer-buyer vertical coordination

High-value agricultural commodities that are perishable are inherently quality-sensitive and subject to high transactions costs, particularly in the case of smallholder production. These transactions costs arise from asymmetries of information between buyers and sellers and the nature of the predominant agricultural production systems in Asia. They are difficult to observe, but are quite real. They are additional to the high marketing costs that arise when infrastructure is poor. Because of high transactions costs in the high value agriculture sector, institutional forms of vertical coordination are key to giving both buyers and sellers a better deal. The integrating

[8] These calculations are based on the share of the manufacturing value added in food, beverages, and tobacco, as estimated in the World Development Indicators published by the World Bank.

institutions distribute knowledge about the product more evenly between buyers and sellers along the marketing channel. Because both sides win.

Both South and Southeast Asia have witnessed the rise of arrangements for vertical coordination of primary production of high-value items with input suppliers and processing/exporting firms during the last 20 years. Input suppliers like seed companies and feedmillers have typically promoted profit and risk-sharing relationships with farmers. Contract farming can be defined as an agreement between a series of farmers and a retailing, processing and/or input supply firm for the production and supply of agricultural products under forward agreements, frequently at a predetermined price, in return for the purchaser providing production support. The latter often includes quality inputs given on credit and technical advice (Eaton and Shepherd, 2001). Typical contract farming schemes in animal production involve feedmillers who supply young animals, feeds, veterinary medicine, and extension advice on credit to farmers who provide holding sheds, dispose of waste, and provide all required labor, water and electricity. Major production decisions are made by the integrating firm. Processors get involved in contract farming when they need a more reliable supply of raw materials.

Milk is a specialized case of contract farming, where dairy coops, processing the milk and facilitate farm access to inputs and extension, is often cooperatively owned. Typically contract farming of high value crops is carried out under the leadership of processing and exporting firms where quality control throughout the production process is critical. Cut flowers and fruit and vegetables for industrially-processed foods are examples. Agro-processors and retail chains that need to be re-assured about the quality of their raw materials find it costly to monitor the quality of what they buy, particularly when they are buying from many smallholders.

Agro-processors use a variety of institutional arrangements for obtaining reliable supplies of raw materials of consistent quality for processing. Each form of arrangement embodies a different way to share the risks, cost, and benefits of high-value commodity supply chains. At one extreme, vertically-integrated corporate farming typically involves a processor or exporter who finds it worthwhile to produce the basic raw material itself without having to deal with independent farmers. Plantation crops such as tea, rubber, coconuts and sweet bananas are typical commodities on such holdings.

On the other hand, contract farming arrangements are typically observed for commodities that require considerable close monitoring in production, have characteristics that are hard to ascertain on an individual basis at sale, require specific quality inputs for quality outputs, have high requirements in terms of producers credits, and embody a substantial degree of market risk, defined as a highly fluctuating producer price across time.

Typical contract farming commodities are poultry (broilers in particular), pigs, milk, seed, certain high quality fruits and vegetables for processors, and to a lesser extent inputs to industrial processing that require close producer quality supervision such as coffee, tea, cocoa, and sugar. In Thailand, for example, virtually all commercially produced broilers are produced under contract, whereas the corresponding figure for the Philippines is 80 percent (Delgado et al, 2003). In India, roughly 11 percent of milk was produced within the public cooperative system in 2001, but a higher share would be correct if contracts with the emerging private sector dairies are included after 1991, and perhaps the majority of production if informal contracts between informal sector milk traders (*dudhyas*) and producers are included (Sharma et al., 2003). Under some circumstances, contract farming can represent an attractive short run opportunity for

smallholder producers, and even offer their best chance to remain involved with high-value agricultural production over time.

Vertical coordination of high-value agriculture and smallholders

The analysis above shows that the only part of agriculture in developing countries that will continue to grow significantly faster then population in the next twenty years is the high value sector. The implications for the vast mass of smallholder farmers in Asia are sobering: to significantly improve their incomes per capita over the next twenty years, they must either be part of the shift to high-value agricultural production or increase the share of income they get from non-agricultural sources. Furthermore, the analysis in the preceding section suggests that unless smallholders enter vertically coordinated supply chains with processors and retailers, they will increasingly have difficulties in participating in growing high-value markets. Finally, even if markets worked well in every sense, many poor rural people are faced with such poor infrastructure that they would have trouble taking advantage of new urban and international market opportunities under the best of conditions. As described by Torero and Gulati (2004), farmers must overcome a "real access gap" of being able to cost effectively transport their produce, before being able to address a "market efficiency gap" that revolves around being competitive with better organized, better informed, better capitalized and larger scale producers.

Two instruments appear critical to break this deadlock for the smallholders: physical infrastructure (such as information technology, roads, and ports) that connects smallholders to markets, and a set of accompanying institutions that reduce marketing risk and transaction costs in the process of exchange between producers and consumers. Appropriate policies of investment in infrastructure need to go together with well-functioning market institutions, to take

advantage of market opportunities to sustain increased agricultural output and raise rural incomes. This is a critically important for smallholders in countries recently experiencing market liberalization. Even if adequate hard infrastructure exists, farmers capture little of the value that they create when market information and markets themselves are not accessible to the smallholders.

Previous conventional wisdom had it that institutions would improve as a consequence of individuals' self interest, and therefore take care of the transaction cost problems arising from information asymmetries (Torero and Gulati 2004). The reality is in that the presence of coordination failure, innovation failure, and authority failure, the necessary institutional solutions to overcome high transactions costs facing smallholders fail to emerge. The high risks of production and cycles of over-supply and price depression create financial risks throughout the distribution chain; these inhibit investment and access to capital. Monopolistic practices, corruption, and excessive regulation also add to the burden of the rural marketplace. The high costs, risks, and "friction" in high-value agricultural markets prevent these markets from achieving sufficient scale for efficiency and similarly prevent the low-cost and reliable supply of production inputs such as seed, fertilizer, and other goods to farmers. Very poor farmers also lack the political empowerment, market knowledge, and business knowledge to address these market roadblocks.

Thus, poor rural farmers typically lack the capacity to improve and influence the markets upon which their lives depend. But some of these assets can be developed through effective organization, technical training, and means for assembly and communication. Pro-poor market institutions are needed to reduce transaction costs, manage risk, build social capital, enable collective action, and redress missing markets. The necessary institutional infrastructure to

facilitate market exchange is a critically important area in countries recently experiencing the shortfalls of market liberalization with regard to smallholder agriculture. When market information and markets themselves are not accessible to the rural poor, farmers capture little of the value that they create, demand and supply are highly unstable, and distribution costs for rurally produced goods are very high. Small farmers in Asia in particular tend to be subject to a specific set of marketing problems.

First, traditional smallholder farmers in Asia typically receive relatively low prices for their produce. This stems both from relatively high—on a world scale—margins between the farm-gate and retail price, but also from low market trust and reputation typically accorded undifferentiated smallholder output when true quality is not known to the buyer at the time of sale. With respect to margins, farmers in India receive only 20 to 30 percent of the retail price of fruits and vegetables, compared with 50 percent or more in the United States (US Dept. of Commerce, 2001). Institutional arrangements such as contract farming can reduce the number of intermediaries, wastage, transaction costs and market risks. With respect to market trust and reputation, which a large firm approaches through branding, smallholders are in a disadvantageous position. They do not have a sufficient sales volume to differentiate the product of individual producers from each other. Sales of sub-standard goods by other smallholders rebound on them.

Even when it is possible for smallholders to band together to give a geographical brand to their product (e.g. Central Gujarat milk), it is not helpful unless a mechanism is in place to credibly ensure that bad product is not included, and to gradually improve the quality of existing product. Performing this market function requires some form of collective action on the part of producers and a form of governance that translate the discipline of the market into enforceable

incentives for compliance with norms. Much of the practical implementation of quality improvement revolves around improving the quality of inputs used and optimizing production and handling practices. In effect, credible certification of output quality revolves around credible certification that only the right inputs and procedures were use din production and handling.

Contract farming is the private sector solution to accomplishing these functions in a way that distributes costs, benefits, and risk sin a manner to maintain incentives for all side to participate. In the animal products sectors, where purchased variable inputs such as young animals and feed are typically 70 percent of the farm-gate price of the output, input supply firms naturally tend to provide the coordination function of contract farming. Transactions costs apply to inputs as well as outputs. Small farmers often are ill-equipped to know the true quality of the animal genetics and feed resources that they buy, compared to larger farmers than either mill their own feed as most in countries such as the Philippines do (Costales et al, 2003), or enforce better compliance with standards from suppliers.

Improved inputs are combined with better practices to embody new technology for production. Contract farming schemes are typically associated with significant improvements of productivity of contract farmers compared to otherwise similar independent farmers, particularly in the case of small-scale farming (Delgado et al, 2003). This observation is not limited to livestock enterprises. The Pepsi project, a joint venture among Pepsico, Voltas and Punjab Agro Industries Corporation approved in 1988 by the Government of India in the State of Punjab, set up the biggest tomato paste plant in Asia, with the capacity to process 650 tons of tomato a day. It contracted hundreds of tomato farmers. It introduced the technology of deep chiseling, and new methods of transplantation such as shovel techniques and bed-head planting, in addition to the introduction of new seed varieties. The technological innovations introduced in contract

farming increased productivity and reduced costs. Within three years of operation, tomato yields increased from 7.5 to 20 tons per acre. The harvesting season for tomatoes was extended from 25 to 70 days and the company also successfully initiated the winter cultivation of tomato in Punjab, with the help of green house technology dissemination (Sukhpal, 2004).

Market risk in terms of fluctuating prices is another problem of great concern to smallholders in the high-value area. The short-run price elasticities of demand and supply for perishable products tend to be rather inelastic, leading to considerable day-to-day price instability for these commodities. The daily prices of eggs and broilers in southern India fluctuate as much as 10 percent, introducing a large risk particularly given that the average profit margins are just 4 percent (Mehta et al. 2003). Whether on a fee or contract farming basis, the returns to the contract farming enterprise are likely to fluctuate less than for independent farmers. Another factor is that in some localities in Asia inputs such as feed are taxed. Companies working with contract poultry growers escape this tax through accounting transfers of feed to contractors that do not count as sales.

Market risk can be reduced by improved methods of sharing relevant market information in a vertically coordinated framework. One such initiative is the *e-choupal* initiative in India, organized by the Indian Tobacco Company's (ITC). *E-choupal* connects 3.1 million farmers from 29,500 villages in 6 states in India through Internet kiosks running on solar-charged batteries and connected by satellite links. At the *e-choupal* sites, farmers can a) obtain information on commodity prices, weather, and news; b) search for detailed information on farm and risk management; c) purchase inputs and other products, and d) sell their crops to ITC centers or the local market. *E-choupal* has been used to source a range of agricultural commodities like foodgrains, oilseeds, coffee, and aquaculture and market a variety of goods and

services like agri-inputs, consumer goods, insurance and market research. The new "e-chain" registered transactions of US$ 100 million in 2003-04 and has reduced transaction costs for a typical soybean farmer from Rs 705 to Rs 335 per metric ton. (Sivakumar 2004). Farmers selling through *e-choupal* realize at least 2.5 percent higher price for their crops than they would receive through the government auction system because of lower transaction costs. At the same time, procurement costs for ITC are also reduced by 2.5 percent as they save on commission paid to traders. The system provides direct market access to farmers and it is estimated that their incremental income is over 20 percent. (World Bank, 2004)

Vertical coordination is also an essential way to lower the transaction costs of lenders to supply credit to small rural producers, by helping ensure that the capital is used as intended by the lender and in a way that ensures repayment. Typical contract farming schemes provide inputs on credit, thus providing the farmer with an important additional resource. Market interest rates for Asian smallholders are typically very high, if they exist at all. In the Philippines, for example, small-scale pig farmers could borrow at private banks for 24% per annum in 2001, whereas large-scale farmers could often borrow at 12%. Credit provided within a contract farming scheme is more likely to be repaid as the integrator has better control over the final disposition of output. In the animal sectors at least, empirical analysis of field data in Asia consistently point to the role of credit in allowing entry of smallholders in high-value agricultural markets (Delgado et al, 2003). Since improved production practices are critical to achieving quality, contract farming schemes typically are associated with a much higher incidence of farm visits by technicians that is independent smallholder farming. The contract farming scheme basically imposes a package of practices, technology and inputs that it then monitors the use of (Tiongco and Delgado, 2005).

Because they manage the supply chain from the farm to the retailer, contract farming schemes are in a position to credibly certify the quality of output. They can do this by directly marketing items raised by contracting farmers themselves, or else by branding that farmers output, which is then sold as such on the open market. Both forms exist in Asia, with Venkateshwara Hatcheries broiler operations being an example of direct marketing (Mehta et al. 2003), and the Soro Soro Ibaba (Swine) Cooperative in the Philippines being an example of branding for sale by the farmer on the open market (Costales et al, 2003). Finally, where direct procurement from the farmer is practiced, as is typical for broilers in Thailand, both fee-based and price-guarantee schemes are used for farmer incentives. Fees are a per unit of product return for the farmer's labor, land, buildings, water and electricity. Price guarantees increase the incentive to farmers to cut costs, but greatly increase the burden on company to monitor production practices and input usage (Poapagsakorn et al. 2003).

A recent study (Birthal, Joshi and Gulati, 2005) compares contract and non-contract producers of milk, broilers and vegetables in India.[9] Contract farming attained substantially higher net profit than non-contract farming because both production and marketing costs were lower for contract farming (see table 5). The share of marketing cost in total cost for non-contract farmers was 20 percent for milk and 21 percent for vegetables, but it was only 2 percent in both cases for contract farmers[10]. The study also confirms that contract farming leads to a sharing of risks between the producer and firm. The coefficients of variation (CVs) of profit of

[9] A major IFPRI-FAO research study on comparing profit efficiency of small versus large independent livestock producers and smallholder contract farmers was carried out with national collaborating institutions in Brazil, India, the Philippines, and Thailand in 2001-2003 (Delgado et al. 2003). The main empirical findings based on farm surveys of independent and contract farmers of different scales in the Asian cases provide a mixed set of conclusions (see Gulati et al 2006 for more details).

[10] Note that these estimates include only the transaction costs faced by farmers. To the extent that the buyer undertakes some marketing functions, the transaction costs may be transferred from the farmer to the buyer. This is an advantage to the buyer but does not necessarily imply lower transaction costs for the marketing channel as a whole.

contract farmers are much smaller than for non-contract farmers. Price volatility was the main reason for high variability in profits of independents.

Table 5. Production and transaction cost of milk, broiler and vegetable production in contract and non-contract farming (Rs/ton)

Commodity	Contract farming			Non-contract farming		
	Production cost	Transaction cost	Total cost	Production cost	Transaction cost	Total cost
Milk	5,586	100	5,686	5,728	1,442	7,170
Broiler*	808	38	846	27,322	90	27,412
Vegetable**	1,485	35	1,520	1,630	437	2,067

Note: For broiler, the firm provides free chicks, feed and medicines to the contract farmers. Vegetable
costs refer to spinach
Source: Birthal, Joshi and Gulati, 2005.

Conventional wisdom suggests that other things equal, agro-processors will find it more advantageous to deal with a smaller number of larger suppliers of raw materials than with a larger number of smaller suppliers. It is therefore interesting that Birthal, Joshi and Gulati (2005) observe that firms were finding it more convenient to contract with smallholders and their associations due to: (i) a lower risk for overall supply in the event of crop failure of one or few farmers; (ii) more flexible production portfolios of smallholders, which would help them to quickly respond to consumers' changing preferences; and (iii) higher quality since smallholders are seemingly more likely to strictly comply with the mandated production practices of firms; and (iv) greater dependency of smallholders on the firm. Furthermore, apprehensions about contract farming leading to exploitation of farmers were shown to be unfounded, as contract farmers in the year of the survey were offered a higher price than the prevailing market price. Vegetable contract farmers received 8 percent higher prices on average, and milk producers received 4 percent more.

Impact of supermarket growth on smallholders

The growth of supermarkets with their heightened concern regarding food quality, consistent volumes, and food safety represent a threat and an opportunity for small farmers. It is a threat in the sense that food safety and quality control are barriers to the entry of smallholders in the supply chain. For example, in China producers need to have their production environment sampled and checked, provide production records and inspection reports in order to be certified as "green food" grower. Producers of "green food" can get a margin five times larger selling to supermarkets, so supermarkets signing contracts with large producers with these certifications can not only ensure quality control but also make greater profits (Bi et al, 2004). In Philippines, for vegetables, only professional suppliers of small to medium scale operations maintain their place in the supply chain. Small producers who managed to supply hygienic vegetables found it difficult to maintain this business link and eventually dropped out. The barriers to integration of smallholders in this chain have been countered in some countries by the formation of cooperatives, contract farming and producers' association which supply directly or through some intermediaries to modern retailers.

However, supermarkets also represent an opportunity for small farmers in that supermarkets know the product requirements of high-income consumers and have the incentive to transmit this information to the farmer through mechanisms of vertical coordination. Thus, potentially supermarkets offer access to relatively high-income consumers and assistance in meeting their requirements. In practice, supermarkets rarely buy directly from small farmers, with or without contracts, but rather procure goods through commissioned agents or assemblers. Depending on the production characteristics of the crop and the distribution of farmers by size of farm, these assemblers may or may not choose to work with small farmers.

The preponderance of smallholders in many Asian countries makes their inclusion in the changing retail structure especially important. The average size of land holdings is around 1.6 hectares in South Asia and Southeast Asia. Farms of less than 2 hectares in size account for 88 percent of the operated area in Indonesia and 81 percent in India. Farms are even smaller in Bangladesh and Vietnam, where over three-quarters of the farms are less than one hectare in size.[11]

For supermarkets reducing transaction costs, ensuring quality of output and avoiding supply fluctuations are of utmost significance. Lowering transaction costs requires fewer transaction, thus modern retail chains have started relying on consolidators. This reliance as well as the practice of passing any possible costs to consolidators makes it more difficult for smallholders to penetrate the system. Smallholders who have managed to link up with the chain are either individually equipped or have joined farmer groups or cooperatives.

However, new forms of vertical linkages, especially in Southeast Asia, are allowing smallholders to participate in the supply chain. The dominance of smallholders in the regions make their inclusion necessary and vertically coordinated supply chains are incorporating smallholders as well as lowering of transaction costs and market risks for both small farmers and retail chains. Small and medium enterprises (SMEs) have begun to expand by building production base and contracting farmers as their suppliers and there are successful cases of producers associations and farmer's professional associations gaining bargaining power by acting together. At least three farmers' groups have begun to collectivize efforts and sell directly to retailers in Manila, including fast food chains (Digal and Concepcion, 2004). Processing

[11] For Bangladesh, Census of Agriculture, 1996, Agricultural Sample Survey 1997. For India, Agriculture Census Division. For Nepal, Agriculture Census 1991. Far Pakistan, Pakistan 2000 Agricultural Census (only private firms). For Indonesia, Philippines, Thailand and Vietnam, data taken from the Supplement to the Report on the 1990 World Census of agriculture, FAO 2001.

enterprises and suppliers are building their own production base or providing technical assistance to contract farmers. Zheijang plums association in China is a farmers' professional association comprising of big producers, companies, small farmers and research institutes. It set up product standards for all farmers and provided information on variety, production, and inputs of members. Technical assistance is provided by universities, extensions services, and research institutes, who are also members of this association (Bi et al, 2004).

Summary

There is a strong increase in high-value agriculture and vertical coordination in Asia. The growth of high-value agriculture is caused by a combination of factors, including income growth, demographics, and policy changes. The emergence of contract farming and other forms of vertical coordination are a response to 1) the rising share of perishable high-value foods being marketed, 2) the increasing scale of processors and retailers which implies the need for a more organized procurement system, and 3) the increasing demand by consumers for food safety and very specific quality attributes which are difficult to ensure without some form of vertical coordination. Contract farming can benefit farmers by providing them with specialized inputs, technical assistance, credit, and an assured market, thus solving a number of problems small farmers typically have in producing new high-value commodities. Empirical studies indicate that contract farmers may enjoy higher profits (though the evidence is mixed), greater production efficiency, and more stable incomes than independent farmers growing the same crops. The benefit to buyers is ensuring a reliable supply of a product that may not otherwise be available on open markets, particularly perishable products, specialized crops, or ones that are new to the area. The larger the buyer, the more important it is to establish procurement systems. For example,

large supermarket chains generally establish lists of preferred suppliers and set private standards for the products they purchase. The decision whether to source from small farmers or large farmers is based on the nature of the product, the skills and resources of local farmers, and the land ownership patterns. In many Asian countries, the overwhelming predominance of smallholders means that supermarkets and other buyers are forced to work with small farmers.

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