9 Agricultural Processing Enterprises: Development Potentials and Links to the Smallholder

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Introduction

In countries where farming and fishing are major productive activities, processing enterprises can have a strategic developmental role. Infrastructural, institutional, and contractual issues arise around them. Whereas consumption and nutrition effects of agricultural commercialization linked to specific processing enterprises are traced in some of the detailed studies in Part V (for example, export vegetables, chapter 12; spices plantation, chapter 14; dairy, chapter 15; sugarcane factories, chapters 13 and 16), this chapter gives an overview of the broader experiences, potentials, and problems of agricultural processing enterprises.

Processing agricultural and fish products so that they may be stored, transported conveniently over distances, and presented in forms appealing to consumers greatly extends the markets in which these products can be sold, enables access to markets not otherwise accessible, and permits sales at higher prices and in larger quantities. Successful processing enterprises can generate foreign exchange, provide employment, contribute to food security by making food available at times when it would not otherwise be available, and be a stable and profitable source of income to farmers and fishermen.

The establishment of processing enterprises was an integral element of development plans of many Third World countries as well as a feature of international aid programs and recommendations of organizations such as the Commonwealth Development Corporation and the World Bank. The existence of effective processing and marketing enterprises was concomitant to the stance of the United Nations Conference on Trade and Development (UNCTAD) that climatic advantages and lower costs pointed to profitable export of various agricultural and fish prod-

ucts from tropical countries, provided that developed-country markets were open to them. Yet, processing plants that were established were not uniformly successful. The lessons from these past failures, based on a Food and Agriculture Organization of the United Nations (FAO) study of some 70 plants, will be discussed in the next section.

A spate of literature during the 1970s (Beckford 1972; George 1977; Lappé and Collins 1977) that attacked export processing for diverting resources from meeting domestic food requirements and for widening income gaps led to a reconsideration of the role of agricultural processing enterprises. During 1984–86 UNCTAD sponsored, in collaboration with FAO, an assessment of the arrangements by which agricultural and fisheries processing enterprises in developing countries acquired their raw materials and marketed their products, and the extent to which they transmitted more advanced technology to associated primary producers, assemblers, and suppliers of production inputs. Forty case studies of processing enterprises dealing with a wide range of products were commissioned (see examples of these listed in table 9.1). The review and analysis of these case studies, together with other relevant studies, form the remainder of this chapter.

Past Failures and Their Lessons

All of the plants studied by FAO that had not lived up to expectations appeared to be well designed from an engineering standpoint. Their main causes of failure or loss were inability to acquire sufficient suitable raw materials for processing, failure to market the processed products successfully, and weaknesses in management that exacerbated the first two problems. While problems in marketing the processed products and in management played an important role in these failures, analysis by Mittendorf (1968) showed that difficulty over the supply of raw materials for processing was the most frequent problem.

Problems of raw material supply included overestimation of potential supply, lack of suitable varieties for processing, insufficient incentives to suppliers, and lack of production support services. Access to a constant supply of suitable raw materials is vital for the efficiency of most processing operations; depending on scale and technology, processing can involve a major investment in fixed plant and equipment, and strategic personnel must be retained and paid through the year to ensure smooth plant operations. In turn, a steady flow of the processed product is essential for success in its marketing. Failure to maintain regular deliveries can have adverse consequences: buyers will be reluctant to enter into firm contracts and promote onward distribution;

prices obtained will be those for fillers around established products; and opportunities for discounts on transport and sales charges may be lost.

Many of the plants in the FAO study were set up in areas where the raw material was apparently in surplus, but in actuality, low yields set limits to increased production. Potential supply was overestimated, as, for example, in the case of the Bolgetanga tomato paste plant in northern Ghana, which was established in conjunction with an irrigation project. The farmers there were inexperienced with irrigation technology and the quantities grown during the succeeding years barely met local demand for fresh produce.

Apparent surpluses can also be bid away from the processor by competing marketing channels. For example, Liebig, a meat processing and marketing transnational, set up an abattoir at Kosti in Sudan, where the prices of live animals offered an attractive operating margin and the location was convenient for supply from large traditional herds and for transportation of the processed products to export markets. However, the plant was dismantled after a few years, as it never received a significant flow of stock; the arrival of the processor had stimulated the traditional buyers to offer better prices and the "surplus" was so thin that they were able to do so with the resources they could mobilize.

For some projects, no proper market outlet studies had been conducted before an investment decision was taken. In others, it was simply assumed—without investigation of production response to a new market outlet—that the establishment of a processing plant would attract a supply of raw materials.

Problems of market demand that included overestimation of prospective demand; misjudgment of tastes, preferences, and habits of consumers; underestimation of competition from other sources; and difficulties of entering foreign markets were also encountered. Management problems also contributed to failures of processing plants.

Errors in decision making of this nature have continued as the following cases tell. Of seven government-sponsored cassava processing plants built in Venezuela, only two were operating in 1980 (Abbott 1988). The Kenana sugar project in Sudan had to be rejuvenated by efforts of externally contracted management (Stauffer 1986). A tea processing plant was established in Rwanda under the assumption that small farmers nearby would collaborate in the provision of supplies, but the farmers were constrained by high staple food prices and concentrated on potato and grain production (von Braun, de Haen, and Blanken 1991). Eventually, a tract of land near the plant was expropriated for direct tea production to meet established plant capacities.

TABLE 9.1 Case studies of agricultural processing enterprises

Commodity	Country	Enterprise	Activity
Rice	Malaysia	Hanapi and Sons	Mill-polished rice, bran, very fine rice, broken rice, and husk from paddy
Maize	Kenya and Pakistan	Corn Products Corporation International	Convert maize to starch, sweeteners, oil-and-gluten feed and flour for livestock
Cassava	Thailand	Cassava chipping and pelleting factories	Transform cassava into chips and then pellets for export
Feed	Nepal	Ratna Feed Industries	Poultry feed processing and marketing of poultry products
Pineapple	Thailand	Siam Food Products	Can pineapples
Limes	Ghana	Rose's Lime Products	Process limes into lime juice, lime oil, and skins; process skins as raw material for pectin production
Fresh orange juice concentrate	Brazil	Juice plants	Process oranges into juice

Fruits and vegetables	Tanzania	Dabaaga Fruit and Vegetable Canning Company	Process products into jams, pickles, juices, and soups
Tomatoes	Taiwan	Taiwan Kagoma Food Company	Produce canned tomato products
Herbs	India	Chalam's Herbochem	Process a range of herbs, meat, and other rural products into extracts for use in drugs
Sugar	Swaziland	Mhlume Sugar Company	Produce and process sugarcane and market refined sugar
Sugar	Thailand	Kumphawapi Sugar Company	Japanese/Thai joint-venture processing sugarcane
Tea	Kenya	Kenya Tea Development Authority	Provide inputs to farmers to grow and pick tea; process and market tea
Tobacco	Thailand	Adams International	Joint venture producing Turkish tobacco
Cotton	Uganda	Bunyoro Cooperative Growers' Union	Gin cotton and sell cotton lint and seed separated by ginning
Livestock	Botswana	Botswana Meat Commission	Purchase and process livestock export products
Broilers	Jamaica	Jamaica Broilers	Produce and market broilers
Milk	India	Anand Dairy Cooperative Union	Process and market milk, butter, milk powder, and other dairy products
Milk	Bolivia	Dairy Industries Enterprise	Bring small farmers into the dairy economy; process milk and produce milk products

SOURCE: Abbott (1988).

Conditions for Success

Case studies of 40 enterprises that have been notably successful in the developing countries were assembled and reviewed (Abbott 1988). These case studies cover internationally known processing enterprises such as the Anand Dairy Cooperative Union in India and the Kenya Tea Development Authority as well as other smaller and less well known representative enterprises, and even the experience of individual persons. Nineteen commodity products are covered, as are an array of developing countries. The cases reflect the processing of raw materials from traditional modes of farming and other activities as well as of materials produced specifically for processing in a new, fully integrated system. These case materials are reviewed for significant leads on (1) effective relationships between processors and raw material suppliers, by commodity groups, and (2) implications for small-scale suppliers, including the scope for their participation in processor-supplier systems, transmission of technology to them, bargaining over terms of sale, and access to food supplies (see chapter 10).

Effective Links Between Processor and Raw Material Suppliers

In most of the successful cases, processors had to lay out money to be sure of their raw material supplies. An enterprise such as Siam Food Products in Thailand experienced poor performance when it was unable to receive its raw material, pineapple, in sufficient quantities from local farmers with whom it had contracts; in response, it had to expand its own direct production (Lee 1976). To ensure supplies, private firms made contracts with producers directly or through private agents. Cooperative unions used their local societies. Unilever Is in Turkey, for example, used a sunflower producers' cooperative as well as independent oilseed crushers (Abbott 1988). In the dried fish production-processing-marketing system in Indonesia, credit went back to the fishermen through an intricate channel of contributions and risk sharing (Abbott 1988). The state dairy enterprise in Bolivia made available in-kind credit (Abbott 1988). Haji Mansur's rice mill in Indonesia advanced funds to farmers to help meet their production costs, and, hence, ensured substantial direct supply of paddy (Harper and Kavura 1985). Straits Fish Meal in Malaysia only paid a market-clearing price for its raw material, but to be sure of supplies, it advanced funds to fishermen before they put out to sea (Abbott 1988).

Many processors also had to channel productive resources in appropriate proportions to their suppliers to obtain a suitable flow of raw materials. This was commonly done through producer/processor supply contracts, which have been found to be effective mechanisms for ensur-

ing that supplies meet the requirements of processors, and, in turn, that producers are guaranteed a convenient outlet. Such contracts have provided an assured market for producers' output, access to the company's technological and associated services, and easier access to credit. Access to technological services involved field advice and training, supply of inputs such as seeds and fertilizer, and distribution of irrigation water. For instance, the contract offered to farmers by the Taiwan Kagoma Food Company included provision of seedlings to ensure uniform quality and harvesting time, provision of pesticides and fertilizers on credit, an agreed price per grade delivered with premiums as incentives, provision of field crates to keep supplies in line with plant capacity, among other features (Meneguay and Huang 1976). In terms of credit, processing enterprises often made loans to farmers at interest rates that were less than bank rates of interest and for longer periods; where enterprises did not provide loans, banks generally accepted a processor contract as collateral.

Producer/processor contracts reduce but do not eliminate risks for both parties. The risk remains that farmers can become dependent on a processor as their key market outlet. The degree to which the producer is captive to such a contract depends on its prices for inputs and outputs relative to those of competing enterprises. The newer the production line in a country, the more limited, often, are the alternative options. Problems can also arise when quality standards, where the contracts specify these as the sole domain of the buyer, are manipulated to reject supplies or accept them at substantially lower prices, to the detriment of the producer.

Diversion of contracted supplies onto local markets for fresh produce is the corresponding risk for the processor. This is an obvious temptation when shortages force up prices. In the case of the already-mentioned pineapple canning project in Thailand undertaken by Siam Food Products, of the 10,000 tons of fresh pineapple expected by the company, only 3,000 tons were actually received in 1972–73 and only 674 tons in 1974–75, one reason being that the local market price was substantially higher than the price negotiated with the cannery (Lee 1976).

The possibility of expected price relationships being upset by external events is best foreseen in processor supply price arrangements. Fixing a specific price in advance can impose strains on both the parties involved. An agreed relationship to a market indicator that reflects current conditions of production and of sale through alternative outlets—for example, a major national market for fresh produce or an international commodity exchange—may be more convenient for both parties. Further alternatives include offering a basic price plus bonuses that vary

with changes in the price of the processed product on designated markets. In any event, the value of contracts with large numbers of suppliers hangs on the mutual interest of the parties involved. Legal enforcement is rarely practicable.

Different Experiences by Commodity Groups

Although the number of plants in each of the 19 commodity groups or subgroups covered in the 40 case studies is small, some observations are permitted, taking into account other relevant studies.

Milk producers always benefit from commitments by processors to purchase their supplies; the perishability of milk makes its prompt disposal onto a liquid market or conversion into a more durable processed product essential. Guaranteed access to a processor is particularly important where production conditions lead to large seasonal surpluses. The processor/distributor is equally concerned to maintain a steady supply. In India, both cooperative and private processors/distributors advance dairy farmers funds to pay for milk cattle, feed supplements, and veterinary services in return for a commitment to maintain regular supplies of raw material (Harper and Kavura 1985; and chapter 15).

Until relatively recently, the processing of poultry was undertaken only by individual producers and retailers. The development of the broiler industry is a classic example of the contract system. The contract system, by reducing both production and marketing risks, has opened the way to large-scale operations: sale at the optimum stage economizes on feed costs, and veterinary, processing, and marketing services can be provided more efficiently. There are various stages of development of the broiler industry. In Lebanon, the industry began as a private enterprise initiative characterized by individual and specialized processors (Reda 1970). Poultry production, formerly a side activity of general farmers, was transformed into a specialized activity as businessmen took advantage of the opportunity of applying imported broiler technology for exporting broilers to the Middle East market, where they already had commercial contacts. In Nepal, a feed processing firm, Ratna Feed Industries, has helped in the development of the poultry industry by distributing feed to dealers on credit as well as broiler chicks, providing technical and economic skills and veterinarian services, and assisting in the marketing of eggs (Mathema 1976). In some countries the broiler industry has developed to the point that large vertically integrated companies handle the production, processing, and marketing of chickens. Contracts are negotiated with farmers to raise chickens. Case studies from Thailand (Poapongsakorn et al. 1985) show that farmers under such contracts with the Charoen Popkhan Group received a fixed fee or wage, whereas in Jamaica (Freiwalds 1983) growers were paid under

three categories of rental, performance, and price that rewarded efficiency.

Producer/processor contracts are particularly important where new crops or new methods of crop husbandry are to be introduced. Case studies of three vegetable processors—Taiwan Kagoma Food Company (tomatoes), Tabasco (peppers), and Basotho Fruit and Vegetable Canners (asparagus)—as well as processing of marigold heads in Ecuador indicate that all companies provided intensive assistance under their contracts to ensure supply in the desired quantities and over an extended supply season (Meneguay and Huang 1976; Truitt 1980; Abbott 1988). This assistance encouraged farmers to commercialize by reducing their risks though providing them with the technical know-how and a guaranteed market outlet. The contracts were quite detailed and the companies essentially had direct control over production. For instance, Basotho Fruit and Vegetable Canners, in order to establish asparagus, a new product in Lesotho, had to develop production from the ground up—it set up its own nursery; supplied farmers with clones, sprays, fertilizer, packing containers, trimming equipment, and shade huts; prepared the soil for them; and financed the cost of boreholes to provide water (Abbott 1988). To ensure that the supply season was extended beyond its normal period, the Taiwan Kagoma Food Company offered a price incentive and contracted with farmers operating in different microclimates (Meneguay and Huang 1976).

Contract processing of fruit for processing is less common. Establishment of fruit tree orchards is a long-term investment, and once they are established, the grower's need for finance is small. The risk is present, however, that the grower's investment may be lost for lack of a market outlet, should the processing plant within convenient reach go out of business or offer very low prices. Long-term comparative advantage in supplying the market is essential. The processing of limes in Ghana by Rose's Lime Products demonstrates how such production can survive radical changes in government policy and highly adverse exchange rates, if production conditions are favorable and plant overhead costs are low (Abbott 1988).

Processing of fruit on a large scale in developing countries is a domain of transnationals, which supply technology, management, and access to the export market. The growth of the frozen concentrated orange juice industry in Brazil came about when North American processors looked around for alternative cheaper and additional sources of supply and brought with them the latest technology (Strohl 1985). In some instances, transnationals even produce their own fruit to ensure uniform quality and state of maturation, which are critical for successful processing on a commercial scale. Del Monte in Kenya and Del Monte

and Dolefil in the Philippines found direct production of pineapple preferable to purchasing from independent farmers, even under contract (Abbott 1988). Siam Food Products in Thailand learned this lesson the hard way, as discussed already (Lee 1976).

Commodities such as sugarcane and tea, where the time period between harvesting and processing is necessarily short to avoid substantial losses in quality, imply close integration between growers and processors. However, labor problems associated with harvesting sugarcane during the short period of maximum yield have led processors to prefer contracts with independent growers. The Mhlume Sugar Company in Swaziland, which had a sugar estate of 3,000 hectares in 1961, began in 1963 to clear and provide 30 to 40 plots of about 4 hectares each per year to Swazi farmers on long-term leases that regulated crop production, agricultural methods, construction, grazing, and other activities (Business International Corporation 1981). The company provided services such as distribution of irrigation water, seed cane, and fertilizers, as well as the cutting and transportation of cane, and partly recovered these costs through user fees. Contracts with smallholders are also advantageous in tea production; with a direct incentive for quality in the leaf price received, smallholders tend to pick tea more carefully than paid laborers. The Kenya Tea Development Authority's smallholder base has consistently produced higher quality tea than the commercial estates (Lamb and Muller 1982).

Transnational Versus National Enterprises

Developed-country enterprises or transnationals were believed at one time to have an advantage in organizing the processing and marketing of agricultural and fish products: they were familiar with consumer preferences and import controls, and they had established distribution channels and brand names. Sales techniques, perfected elsewhere, could give them an advantage in developing-country markets.

Export enterprises in developing countries, linked to a transnational, tend to do better than independent enterprises. Analyzing the Malaysian canned pineapple export business, Jabbar (1972) showed that independent enterprises, that is, enterprises without links to transnationals, sold their products on terms comparable with enterprises linked to transnationals when markets were favorable, but when markets turned down, the independent enterprises were the first to suffer.

In recent years, national enterprises have been gaining ground. By 1986, national enterprises including state trading organizations had a larger share of agricultural-based exports from developing countries than did transnationals. This has been achieved through a combination of sales through brokers, direct contacts with importers, and sales

by state trading organizations, including barter and countertrade transactions.

In domestic markets, the traditional marketing channel is through established wholesalers with their own links to retail outlets. Processors who want to follow their products in distribution use a combination of branch outlets and retail sales. For example, Ratna Feed Industries in Nepal used its regular feed dealers to assemble eggs produced by its feed customers (Mathema 1976).

The failure of processing enterprises in domestic markets lies mainly in their overestimation of domestic demand; sponsors of processing enterprises have tended to assume wider prevalence of high-income consumer tastes, preferences, and purchasing power than was actually the case. Many plants were set up to process goods that would substitute for imports. Protected against competition, they operated with high costs and priced their products accordingly. The result was a spiral of declining markets, reduced sales, and an increasing burden of overhead costs. Problems are associated with external management or orientation. New plants tend to be locally owned and managed, and better adapted in terms of overhead commitments, product design, and sales organization to domestic markets.

Transmission of Technology and Managerial Capacity

The production/marketing contract with a processor has proved to be a highly effective vehicle for the transmission of technology. Farmers with no prior experience with a particular crop have been supplied with a tested package of inputs and husbandry procedures backed up by credit and a guaranteed market outlet, as was the case, for example, with asparagus in Lesotho and marigolds in Ecuador (Abbott 1988). Growers have been protected against risk by all-inclusive contracts, as, for example, the broiler contracts in Thailand and Jamaica (Poapongsakorn et al. 1985; Freiwalds 1983).

Standard technology can be acquired quickly if the price incentive is sufficiently attractive. Seeing their neighbors become rich is stimulus enough for others to learn and emulate. The spectacular growth of the broiler industry in Lebanon during the 1960s came about because of local businessmen taking advantage of opportunities arising from American and European imported broilers (Reda 1970).

A producer cooperative processing enterprise can be an effective mode of transmission of technology to members and staff through group pressure and individual participation in decision making. An example of this mode is the Anand Dairy Cooperative Union in India.

Government advisory and veterinary services, among others, can contribute to the extension and dissemination of new technology, in a

more general sense. For example, in Lebanon, vaccines were distributed free of charge, which greatly reduced the risk of epidemic disease (Reda 1970). However, in many developing countries, the research and development undertaken by governments and their extension messages tend to be too general. They are insufficiently adapted to the needs of particular sets of producers and to the conditions under which they operate. The prevailing government-sponsored system of supplying credit for inputs through a financial intermediary, extension through a government agency, and buying through a marketing board also encounters problems of input timing, coordination, payment, and collection (Mittendorf 1968). In many areas of production, precise recommendations, provision of inputs without cash outlays, and a guaranteed outlet and price by a processor can be decisive in bringing farmers and fishermen out of a static situation.

Processors have found it much easier to introduce new technologies as a complete package associated with a new product than to improve the handling and management of traditional agricultural products. Here, government intervention may be needed to promote new processing technology.

Bargaining Power over Terms of Sale

Once a farmer has oriented his operations towards meeting the requirements of a particular processor, the farmer becomes, to a considerable extent, a captive of that processor (see chapter 10 on this issue). As discussed already, the farmer may also be subject to the manipulation of quality standards, where contracts specify that these are the sole domain of the buyer. Tomato growers for the Taiwan Kagoma Food Company complained that their tomatoes received a lower grade than warranted because of delays in handling their produce after it had arrived at the plant (Meneguay and Huang 1976). They also complained that delays in the provision of crates by the factory, because of a lack of capacity at that time for processing tomatoes, resulted in tomatoes rotting in the fields and the farmers' not being able to profit from them. Of course, there is the risk to the processor that inadequately remunerated suppliers will shift eventually to other activities, but there can be a phase of exploitation until this occurs.

The government can intervene to regulate the contract process. For instance, in Brazil the government requires that the basic producer-to-processor price for juice oranges be negotiated annually (Strohl 1985). In Taiwan, mediation over prices has become accepted practice, after discussions arose over asparagus and mushrooms.

Conclusions

Processing enterprises have various advantages attached to them: they can be major earners of foreign exchange; they can facilitate the capturing of value added by developing countries; they can create employment; they can raise the long-run productivity and incomes of raw material producers; they can transmit more advanced production and handling technology; and so forth. For example, the 138,000 smallholders growing tea for the Kenya Tea Development Authority have cash incomes well above the average for their area, as do the 28,000 growers and associated workers for the Mumias Sugar Company in Kenya. Continuing access to the favorable market provided by the Botswana Meat Commission has stimulated a livestock off-take rate that is much higher than on similar range grazing conditions in other parts of Africa and has been of broad and immediate benefit to the low-income livestock-dependent rural population.

In many countries, the establishment of processing enterprises was left to private initiative and risk or, where initiated under government programs, received only superficial attention with respect to the conditions of economic viability. Now, the scope for development through processing is becoming more widely recognized in developing countries. While a free-trade environment is needed to offer advantages in securing and maintaining export markets, the future of processing in developing countries lies in national participation, appropriate institutional arrangements, and national market and enterprise growth.