



Overview of Contract Farming in Thailand: Lessons Learned

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Abstract

Contract farming is a means to assist small growers in gaining market access and reducing price risk, and as such it has attracted attention from development agencies and governments in developing countries. This paper reviews literature related to contract farming in Thailand and adds updated information based on field visits in 2007. Special attention is given to roles played by government in the initial stage of contract farming development. Conclusively, it is important for the public sector to create a favorable environment and infrastructure to encourage investment in agribusiness and to coordinate the concerned parties to raise agricultural productivity.

The paper also evaluates the effectiveness of contract farming as a means to stabilize farmers' income and strategize agricultural development. The findings show that while the poorest farmers were not excluded from contract farming, special measures may be needed to encourage their full participation. In the long run, small farmers were able to accumulate production and management skills, thus improving their bargaining position. Together with improved infrastructure and a more competitive market due to farmers' innovation, the farmers' best choice may include non-contract production.

JEL Classification: Q13, Q17, L14

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I. INTRODUCTION¹

During the past decades, Thailand's agriculture has diversified from mainly rice to include various cash crops including cassava, sugar cane, kenaf, maize, etc., on dry land and soybean, peanut, and mung bean on both dry and irrigated land. Diversification was facilitated by infrastructure development during the early National Economic and Social Development Plans. During the 4th National Economic and Social Development Plan (1977–1981), policies for value-added exports were promoted and agro-industries grew rapidly, especially in canned fish, pineapples, and tomato products. The 6th Plan promoted the integration of farming and processing and high value-added exports. Compared to other Asian countries, by early 1990 Thailand probably had the most extensive experience with contract farming and the widest range of crops (Glover 1992). By the middle of the 7th Plan, the export value of agro-industrial products had reached 82,000 million Baht and grew to 247,000 million by 2003 (Ministry of Agriculture and Cooperatives 2004) and reached 303,069 million Baht in 2006. In the fruit and vegetable and poultry processing sectors where contract production is extensive, growth rates during 2005–2006 maintained high levels—11.1% and 8% respectively (Ministry of Agriculture and Cooperatives 2007).

Contract farming has been instrumental in providing growers access to supply chains with market and price stability, as well as technical assistance. For resource-poor growers, production input and farm investment on credit are often provided by firms. In return, contractors expect delivery of goods in specified quantities, quality and set prices. Market and price certainty for both parties and integrated farm-processing enhances the country's competitiveness via improved quality products and an efficient supply chain. Well-coordinated contract farming systems assist development in less privileged farming sectors.

Contract farming in Thailand is approaching maturity. In the early stage, the government was heavily involved in monitoring, facilitating and encouraging stakeholders in contractual arrangements. Over time, farmers gained skills, the market evolved, and a more flexible form of contract farming emerged. Today, former contract farmers can negotiate contracts based on their best opportunity. This is found in the case of potatoes in the North and shrimp in the South where growers can switch between open and contract markets.

This paper aims to highlight the government's role in the initial stage of contract farming development and factors that contributed to success and failure, and to evaluate the effectiveness of contract farming as a means for income stability, technological transfer, market access, and agricultural development. The paper is based on a review of literature and the authors' previous and updated field research up to 2007.

II. GOVERNMENT POLICY AND IMPLEMENTATIONS

Contract farming had been practiced in some forms before the 6th National Economic and Social Development Plan (1987–1991). Processed food, e.g. canned fish, pineapples and tomato products, was initially targeted for export markets. Exported canned vegetables in the 1970s mostly carried foreign brand names and contract broiler production started in the early 1980s. Prior to this period, sugar cane and tobacco were produced under contract arrangements. The latter was contracted by the state enterprise.

The 6th Plan included guidelines for the development of agro-industries with a goal of promoting value-added exports. To meet the goal, the government augmented guidelines with the so-called "Four-Sector Co-operation Plan to develop agriculture and agro-industry"

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(4-sector plan). Under this plan, agro-industrial firms, farmers, financial institutions (Bank for Agriculture and Agricultural Cooperatives [BAAC]) and government agencies worked together to improve production systems to reduce price risk and market uncertainty while farmers improved their technical knowledge and raised production efficiency and the quality of raw materials. In addition to general extension services, the government invested 250 million Baht in BAAC (then, 25 Baht = US\$1). The capital gain was used as interest compensation for participating farmers (3.5 % p.a.) and to encourage more farmer participants and to reduce production costs.

During 1987–1993, 12 large projects proposed by 20 private firms were approved, but two did not operate (eucalyptus and integrated hog production) and three ceased production after one year (asparagus, ramie and bamboo for paper pulp) (Office of Agricultural Economics 1993). Nonetheless, Naritoom (2000) reported successful asparagus groups that had contracted with three companies since 1989. The seven remaining projects continued operations after 1993: castor bean, basmati rice, sunflower, wheat, barley, hybrid corn, sorghum, and cashew nuts (Wiboonpongse et al. 1998).

The Office of Agricultural Economics (1991) concluded that the results of the 4-sector Plan were unsatisfactory since some of those projects relied heavily on government support (e.g. provision of free seed for sunflower growers). Plan failure was attributed to lack of management flexibility in light of unforeseen circumstances such as drought, which resulted in low quality and unmarketable produce. Secondly, farmers needed time to adapt to new crops, which usually involves new technology. When new crops did not provide desirable yields and returns, farmers were discouraged and shifted back to their old crops. Thirdly, the extension service was also blamed for this failure (Ministry of Agriculture and Cooperatives 1994). The commodities chosen involved more input and higher risk, and technical support and delivery systems could not cover all the project areas.

Most private contract farming schemes failed in the early 1990s (Baumann 2000). Evaluation of the 4-sector Plan suggested that contract farming was not for every farmer but an alternative to those who could accept new practices or needed credit. Furthermore, government agencies should not be directly involved between farmers and firms, and contracted businesses should grow without continual government support (National Economic and Social Development Board 1995 in Wiboonpongse et al. 1998).

By the end of the Sixth plan in 1991, the NESDB recommended that contract agreements be more effective and beneficial to all parties concerned (Singh 2004). The Subcommittee of the 4-sector Plan came up with several measures in response to issues regarding fairness and risk reduction to assure cooperation between the government agencies and firms. Measures focused on coordination and risk sharing, such as a “project fund” to provide compensation for production and marketing risk, or, “group farming” and “cost sharing” among farmers and firms. The last alternative was considered a novel measure and was not implemented.

To raise the probability of success, the subcommittee in 1995 (the 7th plan) consented to support agro-industrial projects (under the 4-sector Plan) that could reduce production and marketing risks and identify potential target areas and farmers. The proposals were approved based on the highest benefit terms provided to participating farmers by the firms. The subcommittee also improved the 4-sector Plan and indicated two target commodity groups: (i) produce with high-export potential e.g. high quality rice, fruits, flowers, fresh water and coastal fish, and (ii) industrial crops (e.g., vegetables, sunflower, maize, and fast-growing trees). To assure fairness, the government in 1999 took charge of regulating contract compliance using a standard agreement for companies and farmers issued by the Department of Internal Trade (Singh 2004), which is in effect today.

Though there is no explicit mention of contract farming in the 9th National Plan (2002–2006), government agencies continued to implement it. In 2004, to alleviate a trade issue between the People’s Republic of China (PRC) and Thailand, the government compensated farmers if

they reduced garlic crops and switched to other crops under contract farming. In addition, the private sector has been encouraged to extend contract schemes to neighboring countries under a sub-regional economic cooperation agreement called “Ayeyawady-Chao Phraya-Mekong Economic Cooperation Strategy” (ACMECS). The scheme enables firms to reduce the seasonality of raw material procurement (Thai Chamber of Commerce 2006).

III. MARKET COMPETITION

Thai agricultural marketing systems generally are competitive. In contract farming, a quasi-monopoly has been necessary for success. Japanese cucumber contract farming in the early 1990s appeared to be a monopsony when it had a small and specific market. There was only one company making contracts with farmers, and the nature of contracts and close supervision was similar to other crops new to farmers where the final market required exacting specifications. Presently, the crop has become more common despite the strict specifications and quality is maintained by the few companies exporting to Japan.

In high demand crops like potatoes and other vegetables, contracted markets are highly competitive. In 1990, there were only two potato processing companies contracting farmers in Northern Thailand, but five years later, there were seven potato processing firms and the competition for contract farmers became intense. Information was disseminated in the areas and the prices offered by firms were not significantly different. Farmers were not loyal to any specific company and did not hesitate to switch companies when offered a better deal (Ornberg 1998).

After 20 years of potato production, the supply deal changed. This is due to farmers' accumulated production and market experience and innovation, which enhanced their bargaining power. On the other hand, increased demand for potato chips put pressure on firms to secure raw materials, and it became easy to obtain potatoes at lower cost with less quality risk when farmers became skillful in production. Our visits to companies in 2004 revealed that competition for farmers among firms processing the same or different products became fierce in the 1990s before the economic crisis broke out in Asia.

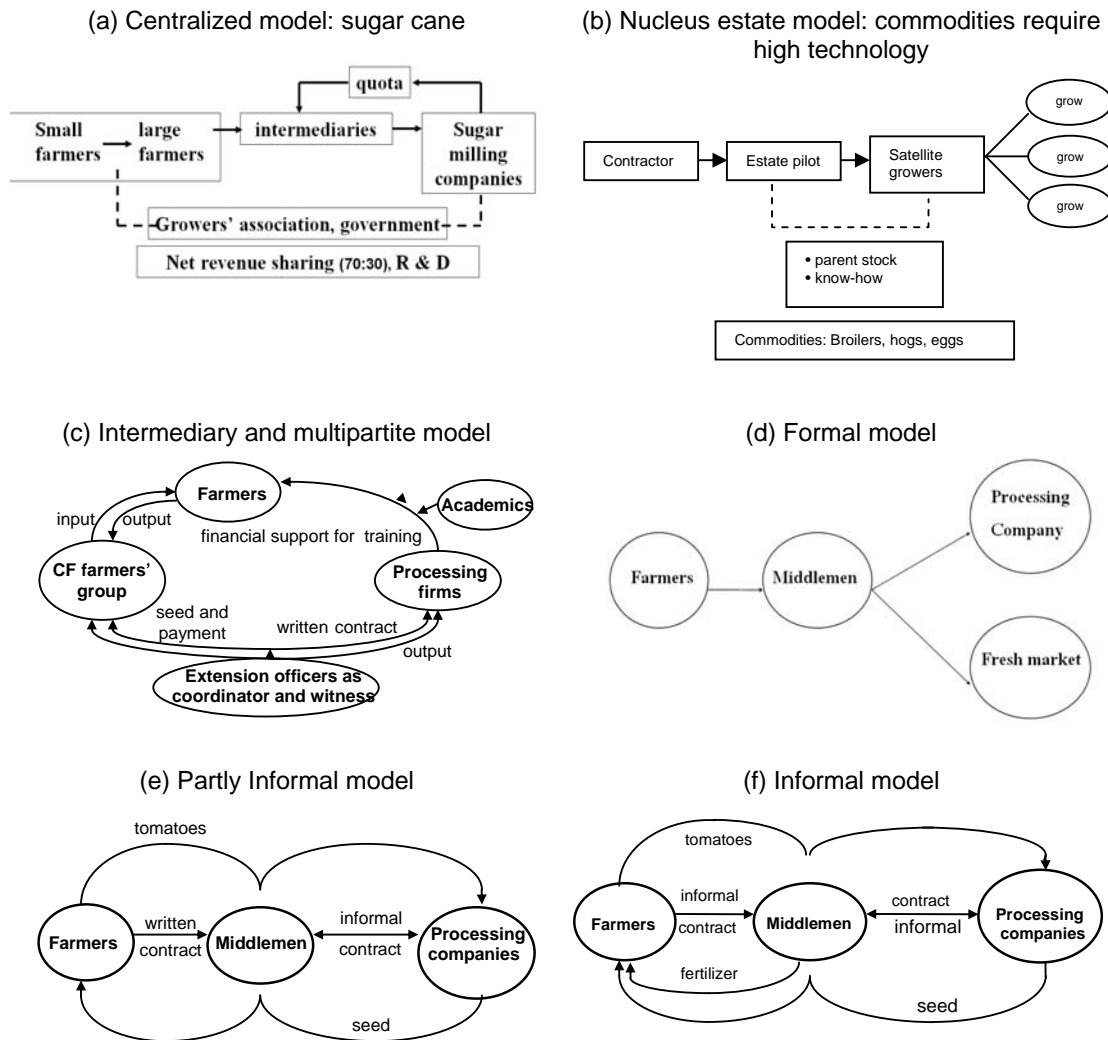
Contract farming has expanded from Chiang Mai to other provinces in the North. Commodities include poultry and hogs, Japanese rice, basmati rice, organic rice, vegetable seed, corn seed, and various fresh vegetables for frozen and pickled products. The commodities are contracted by large and medium firms owned by multinational companies, and joint ventures or by domestic companies. After the 1997 economic crisis, smaller firms left the industry, but competition continued among fewer but larger firms. Now there are at least 3–4 companies competing for the same crops. As disclosed by one company, firms need to exercise different tactics to keep their farmers.

Companies either use price strategy or quality strategy. This implies high market force to obtain labor, suitable land and desirable production environments among industrial firms. For crops that need to be processed within 24 hours (oil palm, eggplant and sweet corn), distance to factories is limited to transport under 12 hours, thus competition is even stronger. While companies compete for farmers, they also mention that farmers seek contracts, and current farmers desire to expand their contracts.

IV. FORMS OF CONTRACT

Contract farming is constructed depending on the crops or products, the objectives and resources of the contractor, and the experience of the farmers (Eaton and Shepherd 2001). In Thailand, four typical contract models can be identified: the centralized model, the nucleus estate model, the intermediary and multipartite model, and the formal model, as delineated in Figure 1.

Figure 1: Examples of various types of contract arrangements in Thailand



Source: Wiboonpongse and Sriboonchitta (1995), Eaton and Shepherd (2001).

The nucleus estate model is suitable for commodities requiring immediate processing after harvest or high production and management technology that farmers lack. The informal model, which is not as complex, may involve just a few market agents without a written contract. Different arrangements have an impact on pricing and other economic factors in the contract farming systems.

V. PRICING

Prices paid for contracted crops are usually lower than market prices. Singh (2004) reveals that most farmers try to sell their produce at market for a better price instead of factories where farmers must comply to specified conditions. This phenomenon was a common problem for inexperienced factories and is likely to happen anywhere that contract farming emerges.

The problem was solved successfully using various tactics. For crops demanded by both processing firms and fresh food markets—e.g., tomatoes—firms allowed 20% of the crop to be sold in the open fresh food market, then during peak season, when prices declined, factories purchased large volumes of high quality produce at contracted prices. The economic rationale is the trade-off between risk and return to farmers and stable prices for raw materials.

Prices companies pay to farmers are partly dependent on quality, which is an additional incentive for farmers to deliver high quality products. For example, for grade A eggplants, farmers receive 5 baht/kg, but the price drops sharply to 1 baht/kg for grade B. The quality difference is only the appearance of the skin, even though the other attributes are the same. Crop quality consistency and standards are often the most crucial factors in a contract. However, Baumann (2000) stated that it is easy for a company to manipulate prices when the market is competitive and prices are volatile.

Price stability is essential if firms are to continue projects with their growers and growers are to maintain income stability. This is especially true in the early stages of contract framing. Both companies and governments try to counter market volatility and find ways to stabilize prices for growers. A prescriptive formula is helpful for sharing costs and benefits between growers and processors. Without acceptable and stable prices or credit provision, projects in less developed areas can fail, as exemplified in several cases in Thailand during the 1980s.

Many farmers have voluntarily opted for chemical-free and organic production for health concerns. However most small tangerine growers in Northern Thailand experienced low yields and undesirable appearances, and thus low prices. In contrast to the findings of Wiboonpongse et al. (2006), contract organic (Jasmine) rice farmers in Payao Province enjoyed high yields and prices 30% higher than ordinary Jasmine rice. Setboonsarng et al. (2007) reported significantly higher profits per unit of land and higher prices for contract farmers in the initial stage of organic production after one to two years of starting than non-contract (for conventional rice in Northeastern and Northern Thailand).

VI. EFFECTIVENESS OF CONTRACT FARMING SCHEMES: SUCCESS AND FAILURE

Contract farming projects have had mixed results. Here we present several cases with farmers' responses in the secondary stage of contract farming and the attitudes of growers in Northern Thailand. Several studies in the 1990s reported that most contract farming schemes had failed, with forestry, cashew nuts and oil palm cited as examples (Baumann 2000; Falvey 2002; Glover 1992). The first two crops were introduced to farmers who had the least resources in the dry land of the Northeast, while oil palm became a rubber crop alternative in the South. In some cases, early successes in contract forestry (eucalyptus in dry land) were not sustained (Baumann 2000). However, a global rise in pulp prices attracted large corporations (e.g., CP, Kaset Roong Ruang, Shell, and Siam Cement Group) and at least 15 Japanese and Taiwanese joint ventures.

Monopolistic conditions have been favorable for contract farming (Glover 1992), whereas competitive environments have not been conducive to contract farming. However, one exception is vegetable contract farming in Northern Thailand, which has developed within

the relatively competitive environment of input markets. Thai farmers are able to acquire input, credit, and buyers on the open market (Baumann 2000; Wiboonpongse et al. 2007; Wiboonpongse and Sriboonchitta 2007). In the case of cashew nuts, the Agricultural Land Reform Office, BAAC, and a private firm program was less successful. This program aimed to cover 175,000 rai (28,000 ha) in 1990, expand to 300,000 rai, and include more than 31,000 farm households. At first the project exceeded its target but was halted by a rapid spread of pests. Poor feasibility analysis and an absence of region-specific research had bearing on the failure, and there were risks that disproportionately affected smallholders (Falvey 2002). Research on productivity improvement and cost reduction is necessary.

There are also successful cases. Overall, contract farming in Thailand has been implemented and managed differently from other countries, with very strong intervention and promotion under the 4-sector Plan as well as Mekong sub-regional economic cooperation. Agribusiness has received substantial incentives and promotion. Since Thailand is agro-exporting country, agribusiness has dominated policy-making. This has resulted in better overall agricultural growth and development effects through the shift to high value crops (Burch 1996; Benziger 1996 cited by Singh, 2004)

In the western region, sugar cane, baby corn and asparagus, and broiler and hog contracts have proven successful. With baby corn, contracts were made between village middlemen and farmers, with middlemen providing farmers with seed, fertilizer, loans, and tractor services. Contracts were made between middlemen and farmers but not middlemen and companies and involved guaranteed minimum prices and additional prices when the prevailing market price increased. In the case of asparagus, the main condition of the contract is to guarantee a fixed price for the whole year for various grades. This is the same model as that used by potato contractors in Chiang Mai and is a successful example of private-government-farmer cooperation (Naritoom 2000).

Thailand is the world's second largest producer of Black Tiger shrimp. During the 5th and 6th National Development Plans, multinational firms like Cargill were encouraged to invest in smallholders financed by the BAAC and other banks. Apparently, returns to smallholders were substantial. However, there is need to assess risk due to accumulated disease and social impact concerning mangrove deforestation. Small growers preferred operating under contract farming to risk taking in a volatile market. They even rejected a cooperative approach after the experience of poor market prices due to inadequate quality control (Falvey 2002).

In the Northeast, the success of exports depends on the provision of irrigation water. Production can be extended during the wet season, and the introduction of dry season crops and non-traditional crops of high marketability, supported by technical advice under a contract farming scheme, has been effective, as in the case of tomatoes supported by BAAC. The expansion of tomato contracting in this region was accompanied by disputes about spoilage, factory shutdowns, and other problems, but they were resolved through mutual-benefit contracts. The case highlights the viability of the government-agribusiness-smallholder relationship as a result of government investment in necessary infrastructure including physical, service, and coordination support (Poapongsakorn et al. 1995 cited by Falvey, 2002).

In the North, contract farming has been successful in such crops as soybean, baby corn, sweet corn, potatoes, tomatoes and eggplant, as well as vegetable and maize seed. The number of vegetable processing firms increased from 34 (1988) to 61 (1994), and to 78 in 2002. Statistics show that more farmers were entering contract farming beginning the early 1990s due to various driving forces. Potato contracts received the most development: production in Chiang Mai increased from 600 ha in 1983 to 1,927 ha. In 1994, and to 3,638 ha and 4,386 ha in the 2002–2003 and 2007–2008 crop years. Contract production has been expanded to six provinces in the North and another three provinces in the Northeast.

Total production in Thailand in 2002–2003 and 2007–2008 reached 6,750 ha and 7,980 ha of harvested area, and 86,700 tons and 125,700 tons, respectively, for total output.

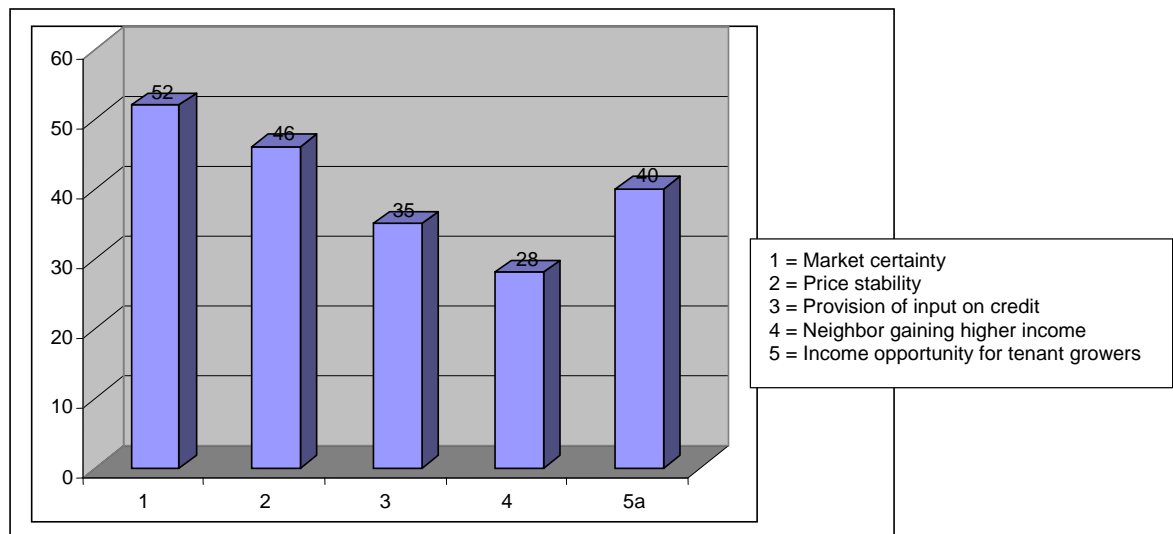
Farmers contracted companies through their groups. In the first stage of the contract, district agricultural extension officers had an active role in coordination and extension in the San Sai district, the first site of commercial potato production in Thailand. The government has promoted such farmer organization in contract farming to better position farmers when they deal with companies and for credit collateral and technical assistance from firms and universities. However, the successful role of the officers in San Sai with well-irrigated land is not replicable in the adjacent district (Mae Rim) due to the local physical and socio-economic environment. Today, farmers in San Sai have turned to selling their potatoes to middlemen who gather, produce and deliver to the companies. While the middlemen have contracts with firms, individual farmers prefer taking risks for higher selling prices. The companies have adopted the contract approach to new farmers in other areas.

Success and failure in contract farming is case by case. According to a CP executive, factors responsible for poor performance in a contract system include personnel factors and uncontrollable factors such as weather. Public policy and support also play significant roles. Success stories are derived from a “win-win” situation where all key determinants are integrated properly: production technology pre-and post-harvest, technology transfer (by the government or private sector), trust building, pricing policy, financial support and human resource development for both farmers and firms (Poonpiriyasup 2007).

In contract hybrid corn production in the Greater Mekong Sub-region/ACMECS countries, the CP reported that Thai growers average yield was second (6.25 ton/ha) after the PRC (6.75 ton/ha). However, Poonpiriyasup (2007) revealed that Thai growers enjoyed the highest rate of return on investment (ROI) at 94% whereas the PRC's ROI was 56%. Contract growers in other countries (Viet Nam, Cambodia, Lao People's Democratic Republic, and Myanmar) earned an ROI of 72%, 85%, and 87%, respectively.

VII. FARMERS' ATTITUDES TOWARD CONTRACT FARMING

Contract farming depends on the satisfaction of both farmers and firms, with profitability a key component. In the initial stage, farmers' perceptions regarding new crops and their attitudes towards contract farming are important. This section presents results from a survey by Sriboonchitta et al. (1996) in hopes that it may be helpful for agencies attempting contract farming elsewhere. Most of the contract farmers surveyed (78%) grew only one contract crop, while the remainder had two to four different contract crops. The survey revealed primary reasons that farmers participated in contract farming. Market certainty and price stability were prime factors, as shown in Figure 2.

Figure 2: Farmers' reasons for participating in contract farming

Source: Sriboonchitta et al. (1996).

Other reasons included lack of alternatives, expectation of higher prices, etc. In addition, from the authors' survey in 2004, tenant farmers (40% of respondents) felt that contract farming provided them good opportunities to raise their income as labor was the only resource they had.

On price agreement, one would expect that most farmers would not be satisfied with the terms. A high proportion of dissatisfaction occurred in processing vegetables for the Japanese market (cucumbers, potatoes, and soybean at 75%–67%). Less dissatisfaction was found in the case of maize seed (47.5%) and tomatoes (49%) where products served domestic markets. Furthermore, studies revealed that new crops and new management restrained farmers in continuing the contracts. In the early stage of contract farming, 35% of the respondents felt that new crops were more complicated, while 43% felt the opposite and 22% were indifferent.

Attitudes were affected by production background and experience. Experienced farmers were likely to find production of newly introduced Japanese cucumbers and maize seed relatively easy (Wiboonpongse et al. 1998). Our 1994 survey found the main reason farmers (52%) kept contracts was high return from the crops relative to their other alternatives. Some farmers (16%) indicated they did so despite not knowing other alternatives, while about 11% maintained contracts because of market certainty.

Firms usually stipulated production quotas on land for contract crops to maintain quality. The average sizes of contract crops per household were only about half of what farmers desired (only 40% of the farmers' land). However, the restriction has been relaxed as demand for raw materials has increased and farmers have become more experienced (authors' 2004 survey).

In a contract farming arrangement, firms provided key inputs, i.e. selected seeds and material, in order to meet consumer preferences. Fertilizer and other chemical inputs were strictly controlled to ensure effective results and control residual levels. All inputs were provided on credit through cooperatives, groups, or middlemen. On average, 80% of the respondents were happy with advance credit as they did not need cash investment.

Most farmers had no information about the price of seed (84%), but knew about fertilizer and chemical prices (68%) since the latter was available in the markets. Farmers who found input prices higher than market prices (31%) or inputs were of poor quality (9%) were mostly maize seed farmers who obtained inputs from the Land Development Cooperatives. Despite good government services in Northern areas, the survey also reported 46% of the farmers

had not received any services, but about the same proportion received production advice (43%), input supply (7%) and meetings with farmers (3%). On average, 40% of the respondents were satisfied with officials' services.

Farmers also identified the types of information and knowledge most important to them: appropriate application of fertilizer and chemicals (38%), alternative crops with available markets (20%), methods for increasing productivity (17%), appropriate production methods (12%) and others (13%).

VIII. INCOME RISK AND EFFICIENCY

Contract farming provided growers with an assured market, stable income, access to firms' services, ease of credit and technical knowledge, and it provides agro-industrial firms with an assured supply of good quality raw material at less fixed investment and low cost. Specific outcomes of contract farming on these aspects are discussed below and are based on Wiboonpongse et al., (1998) except where indicated otherwise.

In the case of Northern Thailand in the late 1980s and early 1990s, half of the farmers earned off-farm income before and after starting contract farming. After starting a contract, 74% of the respondents enjoyed higher household income while 5% reported reduced incomes. Despite the higher incomes, some farmers (26%) incurred losses due to production and quality risk (all contract crops) and market risk (tomatoes). The major problem was crop damage due to flood and diseases (Sriboonchitta et al. 1996).

A more specific comparison was limited to potatoes and tomatoes, which had dual markets. Table 1 shows net returns and variations per rai, (1600 sq. meters or 6.25 rai = 1 ha) of contract and non-contract crops. On average, non-contract crops provided slightly higher incomes (2.5%–10%). Price instability on open markets for potatoes averaged 185% over that of contract prices.

Income discrepancies from the open market reflected price risk and production risk for both crops since the prices were determined by varying market supply-and-demand. However, contract tomato farmers had higher income variations than their counterparts due to the informality of contract agreements and uncommitted responsibility of the processing firm. Potato prices were more under control, even though they varied. In the end, income variation came mainly from yield risk since prices were guaranteed and made known to the farmers in advance.

Table 1: Net return per rai from 1984/85 to 1990/91(in Baht/rai)

Crop	1984– 1985	1985– 1986	1986– 1987	1987– 1988	1988– 1989	1989– 1990	1990– 1991	Average	CV
Contract potatoes	-	-	-	7,790	5,357	7,268	13,862	8,469	0.438
Non-contract potatoes	3,931	5,346	1,620	15,288	12,847	-	14,395	8,676	0.818
Contract tomato	3,435	960	6,874	4,424	8,623	2,910	5,686	4,658	0.556
Non-contract tomatoes	6,120	4,279	4,536	4,381	3,710	6,095	6,706	5,118	0.226

Source: Gedgaew (1993), Note: CV = coefficient of variation

Economic efficiency here refers to the combined effects of production and allocated efficiencies in order to minimize unit cost. (Production cost comparisons between contract and non-contract were not available in other studies, so the conclusion should not be over

generalized.) Unit costs for contract potatoes and tomatoes were lower than those of non-contract farms. Contract farmers outperformed the non-contract farmers. Farmers of both types proved to be profit maximizers under their different production conditions.

Sukasem (1992) found that in contract soybean, non-contract soybean, and both types of tomatoes and potatoes, farmers applied economic rationales. They allocated their main resources optimally in response to output-input prices.

Contributions from agro-processing firms in productivity and quality improvement were significant. The frozen food firm's new variety of soybean raised yields from 800 kg/rai (1991–1992) to 1,300–1,700 kg/rai (1993). For informal contracts like tomatoes, varieties used by farmers in the open market were those once introduced by contract firms. Therefore, fresh tomatoes available in the market were processing types and consumers could hardly find table tomatoes.

A contract system can boost farmers' production efficiency. Wongwiwat et al. (2007) reported in their analysis that potato yields of Chiang Mai growers could significantly increase yields by 43% compared to those of non-contract growers. The know-how followed by education is a dominant attribute of efficiency, while diseconomy of scale was observed for potato production size rising beyond 1.4 ha. (Wongwiwat et al. 2007).

Both farmers and processing firms have had a long process of learning and adjusting to produce raw materials of a standard quality. Contract farmers have learned to accept criteria for "quality," while farmers in general, who sold their ungraded produce in the open markets, were less familiar with the concept. In rigid contracts such as soybean and Japanese cucumbers, contract farmers realized that their income depended on the quality of grades they produced. Fifty percent of new farmers, after training, can deliver high-grade produce. Presently, experienced farmers and additional new farmers, who grasp the concept quickly, understand the value of quality.

Agro-processing firms have been careful in screening farmers they contract. Diligent and honest farmers received first priority, which is still practiced. Farmers' production of contract crops was limited to ensure quality. Field supervision helped monitor production for quality produce and provide regular checks of predicted total production. However, the latter practice did not ensure supply of raw materials. The firms, through middlemen, terminated a contract if a farmer was found to secretly sell his/her produce on the open market or to other firms.

IX. OPPORTUNITIES FOR FARMERS TO GAIN NEW KNOWLEDGE

Farmers under contract for soybean, cucumbers, and maize seed learned new knowledge directly from firms, while potato and tomato farmers had experience and knowledge prior to the contracts. Potato farmers also received knowledge from universities under the firms' support. Knowledge included fertilizer and chemical applications and intensive production scheduling that could be transferred to other crops. Manarungsan and Suwanjindar (1992) report that oil palm, pineapple, and asparagus farmers gained new technical knowledge from input suppliers.

Contract farming can lessen farmers' entrepreneurial ability even if they gain management skills. Farmers under contract for prawns (Office of Agricultural Economics 1989) and ducks (Office of Agricultural Economics 1993) expressed that they lost their freedom in farm management. This hindered their knowledge development and decision-making ability. Advantages and disadvantages are indicated in several contract-farming studies (Wiboonpongse et al. 1998).

The situation has changed. Wiboonpongse and Sriboonchitta (2007) finds that potato growers in the oldest production sites have accumulated production know-how and successfully innovated seed storage in place of seed supplied by contract firms. With

accumulated marketing knowledge and inputs from local stores and brokers, growers have been cultivating early potatoes to earn favorable prices at 14 baht/kg on the open market; when the normal harvesting date approaches, prices revert to the contract price (8 baht/kg). Seed storage technology has allowed growers in many production areas to decide whether to grow with or without contracts.

Table 2 illustrates experienced potato growers who are able to enjoy margins twice as high as less experienced (non-contract) growers in similar production environments.

Table 2: Comparison of contract and non-contract potato production in Chiang Mai province (2006)

	No. of growers	Total cost (Baht/rai)	Yield/rai (kg)	Seed cost (% to total cost)	Price received (Baht/kg)	Total revenue (Baht/rai)	Margin to growers (Baht/rai)	Average cost (Baht/kg)
CF in Chiang Mai	30	16,133.39	2,407.23	33.25	8.22	19,779.43	3,646.04	6.70
NCF in Chiang Mai	34	18,596.47	2,745.59	14.93	9.64	26,462.63	7,866.15	6.77

Note: area is expressed in rai (6.25 rai = 1 ha); income is in baht/year (40 baht = US\$1)

CF = Contract farming, (new/less experienced growers)

NCF = Non-contract (experienced growers)

Source: Wiboonpongse et al. (2007)

X. CONTRIBUTION TO RURAL DEVELOPMENT

Literature in the early 1990s indicated contract farming had not done very well or even failed in Thailand (Glover 1992; also cited by Baumann, 2000), presenting an inaccurate picture when considering the relationships between specific company contracts and farmers or groups. Farmers do seek favorable terms that they perceive to be better for them. In a broader sense, contract farming in Thailand, especially in the North, had been increasing prior to the economic crisis of 1997. The trend continued after the economic recovery, as confirmed by expansion of agro-industrial firms and production areas.

Contract farming has been a key element of the Thai Government's development plan, reflecting a strategy of "private-led integrated agricultural development" (Glover 1992, in Singh 2004; Wiboonpongse et al. 1998). However, Siamwalla (1996) stated that in the past, the government has relied too much on the private sector to provide new technology through contract farming. This was successful in some cases, but not all. Regardless, the private sector in Thailand has played a significant if not leading role, especially when interacting with farmers (e.g., the use of fertilizers, seed, and chemicals) due to the profit motives of input suppliers and contractors.

Government agencies should play a role in directing and facilitating the private sector's implementation of technological transfer for fair business, as it had successfully done with potato contracts. Universities and research centers, especially the National Biotechnology Center (BIOTEC) and Thailand Research Fund (TRF), often contribute basic knowledge for the private sector's R&D. Currently, policies of BIOTEC and TRF encompass public-private research collaboration in order to answer the needs of business.

We agree that contracts can be unfair. In this regard, contract farming does not seem to be a desirable means for rural development. However competitive environments within and among sectors (potatoes, seed, vegetables) induce more alternatives for growers when firms have to compete for contract farmers and land.

There is no indication that the poorest farmers are being excluded in the firms' selection of contract farmers, despite opinions to the contrary. Wiboonpongse and Sriboonchitta (1995) found that the farmers operating under contracts were generally smaller than non-contract. Most were small farmers; their growing area was about half the farm size of those in the Upper North region (3.74 to 4.8 rai for contract farming and 4.7–5.82 rai for non-contract

farming). The average size of cultivated land for contract crops is usually limited for quality control. Potato contracts are an exception (Wongwiwat et al. 2007), possibly because potato production is established and commonplace.

In annual crops like vegetables, firms value growers' diligence, hard work habits and honesty. Tenant farmers have an equal chance to obtain the same quota providing they possess sufficient labor and crop experience. The situation can differ in forestry and livestock (broilers and hogs), where land and capital investment in animals is substantially higher

As No.14 on the list of the world food exporting countries (Food and Agriculture Organization 2005), Thailand is the leading net exporter of food in Asia. Safety and environmental issues of food consumption in the EU, US and Japan require products to conform to standards such as ISO 14000, Codex Alimentarius Standard, and in general, HACCP. To meet these standards and be competitive, Thailand must adopt cost-effective production and management along the whole supply chain. Sriwichailamphan (2007) reports contract growers of pineapple, broilers and shrimp have adopted good agricultural practices (GAP) or good animal husbandry practice (GAHP) (also Code of Conduct for shrimp) due to contract farming advice from relevant companies. This factor was most likely to be taken seriously and adopted when compared to other factors (farmers' environmental awareness, animal survival rate, or pressure from the importing countries).

XI. WELFARE: THE MISSING DIMENSION IN CONTRACT FARMING

Farmers in developing countries belong to the informal labor sector, by definition of the International Labor Organization. In most countries, social welfare schemes do not extend to benefit farmers (only 20% of informal labor around the globe has adequate social welfare). In Thailand, it is only recently that Thai citizens have received very modest social or public health insurance. As for the social welfare policy, the Thai government targeted only 0.3 million informal labor workers in the agricultural sector to be covered in 2006. In Northern Thailand, 86% of the farmers reported belonging to least one of these schemes. None of the contract farmers in Thailand and elsewhere receive welfare benefits from formal contract firms. Interviews with the management of international firms confirmed there was no provision of health insurance etc. in the contract.

As contract farming has been expanding in Thailand and extending into new areas in the Greater Mekong Sub-region, it is imperative to consider the welfare issue in addition to fair trade and market access aspects. This is especially recommended for projects under development of agencies like ADB and the Regional Economic Cooperation—e.g., the Ayeyawady-Chao Phraya-Mekong Economic Cooperation Strategy (ACMECS).

XII. CONCLUSION: LESSONS LEARNED

This section summarizes lessons drawn from the authors' reviews as they relate to this paper. The conclusions are subject to the different results of various case studies, which are influenced by specific environments. However, general directions one may consider when implementing CF in particular settings can reasonably be stated as follows:

1. At the initial stage of contract farming, it is necessary that both contractors and growers have a clear understanding of the concept and roles they play in an agreement. Rigid contracts are untenable, as farmers do not fully understand concepts, standards of quality, or loss due to late or untimely delivery.
2. The rigidity of contract terms, which is for fairness to both parties, does not apply to all types of commodities; it depends on local settings. Policies should be directed towards encouraging competition among firms for growers.
3. Farmers need time to adapt to technology and new habits. Contract crops usually require precise working schedules and intensive management. Farmers may not obtain desirable returns in the first year. Yield and quality risk may discourage farmers' continuation of contracts. Contract agreements designed to spread risks among parties have been appreciated, as in the case of frozen vegetable crops. Minimum returns with intensive and close supervision by firms to avoid crop failure can be incentives.
4. The public sector has a role to play in technological and institutional development. Government should plan incentives they can manage. Universities, with the support of firms and local officials, can provide regular training in the early stages.
5. Although agribusiness took the lead in contract farming, government policies have provided a favorable environment for domestic and foreign investment through taxation, financing, and the 4-sector plan. For example, the success of tomato contracts in less developed areas (Northeast) was due to irrigation and infrastructure improvement, understanding by farmers, efficient coordination, transparency and timely supervision.
6. For annual crops, contract farming in more developed areas (North) appears to be effective for linking smallholders to the market. Farmer selection is unrelated to land size. Tenant farmers have an equal chance to join the project.
7. With rising land prices and a competitive global market, firms need to minimize costs for given quality. Competition has led to competitive prices for potatoes, soybean and eggplant. There is a need for government biotechnology research into quality, efficiency improvement, and cost reduction. Domestic firms should also conduct adaptive research for specific localities.
8. Farmers need information on risk management so they can allocate risk between contract and non-contract cultivation. Innovation (e.g., cold storage for seed) allows farmers to cultivate outside the contract even for the same firms and gain high prices for early harvest. In this case, contracts are no longer the best choice for potato growers at some sites.
9. Commitment from local officials is a key element of success in the early stages of contract farming. There should be a non-financial incentive system to encourage officials' involvement.
10. Contract farming can be promising for agro-industry development. The quality of farm produce can be rapidly improved through contract farming to meet global market standards. This will require thorough effort from local agencies. It is also important to control exploitation of farmers by private firms.

11. Price stabilization can help alleviate income risk; however, firms' quasi-monopolistic power could dampen productivity. This role could be better if firms apply more competitive pricing.
12. Thailand's experience reveals that contract farming has been a successful means for the poor farmer majority to participate in the market. There is the potential for increasing farmers' economic capacity by contracting in an open market.
13. Contract farming is a commercial activity, and none of the reviewed literature indicates growers' welfare or health issues. Therefore arrangements need to consider liability and health aspects for participating farmers.

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