An Economic Study of Contract Farming in the Fruit and Vegetable Industry in Sri Lanka: A Case Study of Gherkin (*Cucumis sativus*) Production

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スリランカにおける果実・野菜産業による契約農業の経済的研究
—ピクルス用キュウリ生産の事例—

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本論文は、スリランカにおいて果実・野菜産業が実施している契約農業について産業及び農民の視点から考察した。データは輸出向け高付加価値農産物の国内最大の契約農業に参加する農民、同契約農業に参加しない農民、そして果実・野菜産業から収集された。契約農業は果実・野菜産業にとって重要な原材料の供給源であった。ピクルス用キュウリ生産の事例研究によって、十分な家族労働力と企業家精神が契約農業に参加する農家の必要条件であることが明らかになった。さらに、契約農業への参加によって所得が顕著に向上し、

農業所得を比較しても、契約農業に参加した農家は非参加農家の農業所得を大きく上回っていた。先行研究等が強調する「貧農を犠牲にして富農が契約農業に参加する」という悲劇は見られず、所得分配の点でも契約農業は一定の成果を果たしていた。しかしながら、企業による機会主義的行動や低い固定価格での買付に従属しなければならないという小農の弱い取引力の実態が見られた。この取引力に関する問題を解決し、小農による果実・野菜産業との契約農業を発展させるための組織的・制度的改善は今後の研究課題である。

1. Introduction

In Sri Lanka, farming by small farmers is both a major activity in the rural economic sector and the major source of rural employment. Their production is dominated by paddy, which accounts for about 45% of the total agricultural landholdings (Weerahewa, 2004). Paddy farming has become an increasingly unprofitable venture overtime (Epaarachchi et al., 2002). Hence, their farming can no longer be competitive without switching from paddy into horticultural or other high

value crops. However, such a diversification has not been always proven to be an easy task as these high value crops are more labor- and capital-intensive. Besides, their profitability is more dependent on meeting market requirements like freshness, quality etc. In this context, from the aspects of access to inputs and markets as well as poverty alleviation, contract farming in Sri Lanka has been widely discussed as a strategy to commercialize peasant farming in cooperation with the agribusiness industry (Dunham, 1995).

Contract farming is widely practiced in the poor regions of developing countries, particularly in Africa and Latin America and has been extensively studied with an abundance of literature available on this topic. Some of these studies criticize contract farming as an

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institution favoring agribusiness companies and larger farmers. Singh (2002) has highlighted that contract farming schemes in general favor wealthier farmers, largely neglecting the poorest segments of the rural population. Contract farming is also known to exclude small farmers and give rise to social differentiation (Korovkin, 1992 and Key and Runsten, 1999). The agribusiness companies exclude small farmers mainly due to the incremental transactions costs generated by small farmers (Key and Runsten, 1999 and Sartorius et al., 2003). Furthermore, contract farming has also been criticized as being a tool for agribusiness companies to exploit an unequal power relationship with farmers (Porter and Philips-Howard, 1995; Key and Runsten, 1999 and Singh, 2002). However, some empirical case studies indicate that by utilizing village intermediaries and farmer organizations/groups contract farming can be made more accessible to the poor (Warning and Key, 2002 and Esham et al., 2005).

Another stream of studies using practical case studies investigate the rationale and implications of contract farming in the context of developing countries. These studies examine contract farming from various aspects ranging from impact on local economy, the community, and food security to farmer relationship with the agribusiness companies (Glover and Kusterer, 1990; Little and Watts, 1994; Dunham, 1995; Raynolds, 2000 and Echanove et al., 2005). For instance, Glover and Kusterer (1990) and Little and Watts (1994) based on case studies mainly from Latin America and Sub-Saharan Africa have identified circumstances in which members of rural communities have been directly or indirectly harmed by contract farming or have realized only limited benefits. However, these studies lack sufficient empirical evidence to substantiate the findings. Hence, along the latter stream of studies, we undertake an empirical case study of contract farming in the context of Sri Lanka to examine the economic implications and the nature of farmer relationship with the agribusiness company. For this, it is important to understand, what type of farmers participate in contract farming, impact of contract farming on income, and their relationship with the agribusiness company.

Therefore, in this paper, we study the largest export-oriented high value vegetable production contract farming scheme in Sri Lanka. Besides, we also examine the fruit and vegetable industry in Sri Lanka to identify their raw material procurement sources and their perception about small farmers as suppliers to the industry. The reason for choosing this industry is that fruits and vegetables are considered as potential candidates for crop diversification and commercialization of peasant farming in Sri Lanka (Dunham, 1995).

2. Method

(1) Data collection

The data for analyses were collected from ten fruit and vegetable processors, seven exporters, the largest supermarket chain in Sri Lanka, and participant and non-participant farmers in the contract farming of gherkin production. The processors and exporters belong to the Sri Lanka fruit and vegetable producers processors and exporters association which is the main organization representing the interest of the fruit and vegetable industry in Sri Lanka. A questionnaire was used to collect data from the fruit and vegetable industry on procurement sources, constraints in procurement, and the perception about small farmers as contract partners to supply to the industry.

For the case study on contract farming, we selected gherkin production in the Kurunegala district of the Northwestern province in Sri Lanka, and interviewed 100 farmers¹). However, due to low reliability and missing data, the effective samples used for statistical analysis were 81 farmers (that is, 49 participants and 32 non-participants).

The farmer interview schedule consisted of four parts. The first part was on the demographic information; the second part on crop production and farming and non-farming income; and the third part on evaluating farmer-agribusiness company relations using a four point likert scale. The final part of the questionnaire consisted of nine statements covering entrepreneurial behavioral dimensions like risk preference, innovativeness, and opportunity seeking. Entrepreneurial behavior was measured by a five point likert scale; for each

statement there were 5 response categories, namely “strongly agree”, “agree”, “neither agree nor disagree”, “disagree”, and “strongly disagree” and the scoring was done by assigning 5, 4, 3, 2, and 1 points respectively. The nine statements were as follows: Risk preference (measured in terms of willingness to invest in farming) such as (1) taking a loan to expand the farm business, (2) use of adequate amounts of fertilizer to get an optimum yield, and (3) purchase of higher quality seeds even if the price was high; Innovativeness (measured in terms of willingness to do something new) such as (1) adoption of new methods in farming, (2) crop cultivation during off-season, and (3) trying new fertilizer and agrochemicals; and Opportunity seeking (measured in terms of willingness to seek for new information) such as (1) reading and listening to agriculture news in newspapers and radio, (2) deciding the crops to plant based on market information, and (3) participation in farmer-training programs. The scale was highly reliable with a Cronbach’s alpha of 0.90. In addition, information on the operation of contract farming was collected from the officials of the agribusiness company.

(2) Model to estimate the impact of participation on farming income

In estimating the impact of participation in gherkin contract farming on farming income, it is necessary to take into account the issue of selection bias. There may be reasons for the participants in contract farming to earn a higher income than non-participants even if they had not participated in contract farming. For example, if the participants’ management skills were unobservable but positively correlated with income, they would earn a higher income irrespective of participation. Therefore, a simple regression of income on a dichotomous variable that indicates participation will overestimate the impact of participation on income. There are many approaches to deal with sample selection bias; however, none of them are considered to be efficient all the time due to their limitations (Winship and Mare, 1992). For this study we selected the Heckman two stage approach as it is one of the most widely used approaches to correct sample selec-

tion bias (Winship and Mare, 1992). Besides, this approach was used in a similar study by Warning and Key (2002) to estimate the impact of contract farming on the income of participants. In this approach, for correcting sample selection bias the probit model expressed below is used as the selection equation.

$$P_i = \alpha Z_i + u_i \quad (1)$$

Where P_i is a dummy variable (1 for participants and 0 for non-participants). Z_i is a set of all observed factors that may account for participation in contract farming and u_i is a random error term, which is assumed to be normally distributed to take account of unobserved factors that influence participation in contract farming. From this equation, the inverse of Mills ratio (M_i) is computed, which is then inserted into the second stage outcome equation to estimate the impact of contract farming.

$$Y_i = \beta X_i + \gamma P_i + \delta M_i + \varepsilon_i \quad (2)$$

Where Y_i is gross farming income. X_i are characteristics affecting farming income and ε_i is a random error term. One important limitation in this model occurs when there is collinearity between the inverse Mills ratio and the regressors in the outcome equation (Puhani, 2000). In this case there was no such collinearity problem as it was confirmed by calculating R squared of the regression of the inverse Mills ratio on the regressors of the outcome equation as described by Puhani (2000).

3. Brief overview of the fruit and vegetable industry in Sri Lanka

(1) Production and export

In Sri Lanka, about 602,000 metric tons of vegetables and 855,000 metric tons of fruits comprising over 40 vegetable and 50 fruit varieties grown in different agro-climatic regions are produced annually. It is estimated that 30-40% of fruits and vegetables goes to waste between harvesting and marketing due to poor post-harvest handling, while there are absolute problems like poor production technology, lack of markets, and under-development of the processing and export industry.

The fruit and vegetable industry in Sri Lanka mainly comprises of processors, exporters, and supermarket chains. Majority of the fresh fruit and vegetable exporters and processors belong to the small and medium scale industry. Less than 4% of the annual production of fruits and vegetables are used for value addition by processing, exporting, and catering to the high-end markets through supermarket chains.

Gherkin is cultivated for export by a relatively large number of small farmers on production management contracts in Sri Lanka. In the mid-1990s a number of agribusiness companies were involved in gherkin cultivation with the participation of about 15,000 small farmers (Dunham, 1995). Gherkin in the *brine* and gherkin in the *vinegar* were the major revenue sources in processed food export sector during the period 1992 to 1995. Since then, the exports declined due to the competition in the world market and shifting of the industry to India.

(2) Fruit and vegetable procurement under contract farming

The fruit and vegetable processing industry companies were mainly involved in processing ready to serve beverages, squash, jam, chutney, pickles, and sauces mainly for the domestic market. The Gulf and Maldivian markets were the main destination for fresh fruits and vegetables while processed fruits and vegetables were exported to the Japanese and European markets. All the processors and majority of the export companies interviewed were limited liability companies. The processors have an average employee strength of about 180 employees and processing equipment worth about Rs 54 million while the exporters on average have an employee strength of 50 employees. The supermarket

chain (Cargills Ceylon limited) is a public quoted company with more than 2,500 employees. It is the largest supermarket chain in Sri Lanka with 50 supermarket outlets in the country.

As shown in Table 1, the contract farming appears to be an important source of fruit and vegetable supply to the industry except for exporters of fresh fruits and vegetables. More than 3,750 contract farmers supplied fruits and vegetables to the processors and the supermarket chain. The largest supermarket chain in Sri Lanka with the recent rapid expansion of outlets in the country is extensively using contract farming to meet its fruit and vegetable requirements. Meanwhile, due to small scale of operation, the exporters did not extensively practice contract farming and instead they procured fruit and vegetable from the open market.

(3) Perception about small farmers as suppliers

Lack of continuous supply and poor quality of fruits and vegetables were two major problems faced by the industry in procurement of raw materials. These problems were mainly attributed to the seasonality of fruit and vegetable production, poor farm management practices, and post-harvest handling. The supermarket chain was able to overcome these problems by practicing contract farming and ensure continuous supply of high quality fruits and vegetables. The seasonality problem was overcome by contract farming in different agro-ecological zones. The quality issue was overcome by providing contract farmers with know-how, inputs, and production technologies via the contract arrangements.

According to the discussion with the officials of the Sri Lanka fruit and vegetable producers processors and exporters association, the members had a positive

Table 1. Fruit and vegetable procurement by the industry*

Year	Procurement sources in %			Volume of annual procurements (metric ton)	No. of contract farmers
	Open market	Contract suppliers	Contract farmers		
Processor	18.6	36.3	45.1	10,596	3,063
Exporter	65.0	27.6	7.0	8,676	45
Supermarket chain	0	25.0	75.0	7,200	750

Source: Author's survey (2003).

Notes: 1) Data are for ten processors, seven exporters, and one supermarket chain.

2) * Data are for one-year period from December 2002 to November 2003.

Table 2. Industry perception about small farmers

Industry perception	Mean	Standard deviation
Contract farming as a reliable source of supply	3.98	1.01
Farmers ability to supply quality raw materials	3.32	0.98
High transaction cost of managing contracts	3.53	1.24
Farmer organizations and farmer companies as intermediaries in facilitating contract farming	3.92	0.87

Source: Author's survey (2003).

Note: Scales are 1: strongly disagree, 2: disagree, 3: neither disagree nor agree, 4: agree, and 5: strongly agree.

perception towards developing supply relationships with small farmers. However, lack of proper organization models to organize small farmers was seen as a major constraint resulting in high cost of establishing and managing linkages with small farmers.

As shown in Table 2, contract farmers were perceived to be the reliable source of fruit and vegetable supply to the industry, as the mean score was nearly 4 (that is, "agree"). The industry has a slightly positive perception on their capability to produce high quality products to meet the industry requirements. However, it was perceived that one major constraint faced by the industry in contracting with small farmers was the high transaction cost involved in managing the contract. This was particularly evident for exporters of fresh fruits and vegetables as these companies were relatively small scale and they could not invest in contract farming with small farmers. The contract farming involving high value crops entailed considerable investment to start up and manage the contract. Furthermore, the institutional innovation in the form of farmer organization or farmer company was seen as an effective way to reduce the high transaction cost of setting up and managing the contract farming.

4. Gherkin production under contract farming

(1) Outline of the gherkin contract farming

At present, only a Sri Lankan multinational corporation is involved in large-scale gherkin production and export. This company has produced gherkin since 1989 and at present produces about 3,550 metric tons of gherkin annually through contract farming with about 1,700 farmers cultivating about 385 ha annually.

The contract farmers are selected based on assured irrigation and commitment as well as suitability of land.

Their contract farming is production management type, under which the company not only agrees to buy the contracted acreage and specified quality at a fixed price, but also provides the necessary inputs like seeds, fertilizer, agrochemicals, and extension services while stipulating that the contract farmers follow a particular production method. Initially a written contract is signed for one season. Then, based on the performance of contract farmer the contract is renewed for the following seasons. Only contract farmers grow gherkin due to high capital requirement and lack of markets.

(2) Agricultural resource endowments of participant and non-participant farmers

Table 3 presents a comparison of the agricultural resource endowments between participant and non-participant farmers in the gherkin contract farming. Participant and non-participant farmers do not differ in terms of family labor, arable land owned, area cultivated, and market value of agricultural assets owned. However, the number of draft animals owned differed significantly. This is because land preparation for gherkin cultivation is mainly done by using draft animals as the plots are relatively small (average area cultivated is 0.22 ha). The absence of major differences between the two groups indicates that the agricultural resource endowment has not been a decisive factor in participation in the gherkin contract farming.

(3) Net profits of crops cultivated in the area

Herein, the comparative advantage of gherkin production is discussed on the basis of net profit in relation to other crops. The net profit is the return to land, agricultural capital, and family labor. As shown in Table 4, regardless of the crops, the highest cost is on agrochemicals and fertilizer, which accounts for about 50% of the total management cost on average. Total

Table 3. Comparison of agricultural resource endowments between participant and non-participant farmers

Items	Participant	Non-participant	t-statistic	p-value
Age of household head (years)	43.38	44.37	0.376	0.708
Education level of household head (years of schooling)	7.89	7.50	-0.558	0.579
Family labor (adult equivalents)	2.69	2.38	-1.163	0.248
Arable land owned (ha)	1.38	1.52	0.531	0.597
Coconut land owned (ha)	0.28	0.39	1.333	0.186
Area cultivated (ha)	0.46	0.48	0.151	0.880
No. of draft animal (heads)	3.10	1.50	-2.939	0.004***
Agricultural assets (market value, Rs)	45,125	29,634	-0.951	0.345

Source: Author's survey (2003).

Note: *** significant at the 1% level.

Table 4. Net profits of main crops per hectare

Items	Gherkin	Paddy		Vegetable	
		Participant	Non-participant	Participant	Non-participant
A: Revenue per cultivation (Rs)	191,784	31,103	33,953	72,640	63,286
B: Cost per cultivation (Rs)					
Seeds	5,434	1,102	849	4,430	5,177
Fertilizer and agrochemicals	50,197	8,436	6,639	12,414	11,695
Hired labor	13,676	1,995	915	6,658	7,056
Irrigation	10,443	0	0	3,339	2,935
Draft animal	1,657	1,615	4,143	1,610	1,503
Other	0	0	150	108	633
Total (Rs)	81,407	13,148	12,696	28,559	29,000
C: Net profit per cultivation (Rs)	110,377	17,955	21,257	44,081	34,286
Ratio of revenue to cost (A/B)	2.36	2.37	2.67	2.54	2.18
Ratio of net profit to revenue (C/A)	0.58	0.58	0.63	0.61	0.54

Source: Author's survey (2003).

Note: Cost per cultivation is the total variable cost of producing a crop in one production cycle. Fixed cost is not included.

management costs of paddy and vegetable production are nearly the same between participant and non-participant farmers. The total management cost of gherkin production is considerably higher than those of other crops, particularly because of absolutely high costs on agrochemicals, fertilizer, hired labor, and irrigation. Besides, due to high input cost, the ratios of revenue to cost and net profit to revenue (net profit margin) of gherkin are not significantly different from other crops. However, despite the high input cost, the gherkin production can earn a net profit five times higher than paddy production and three times higher than vegetable production.

5. Determinants of farmers participation

Using the probit model, farmers' participation can be explained by several variables assumed to influence the decision to participate in contract farming, such as farm household characteristics, resource endowments and distance from farm to the main road.

The analytical result of the probit model is presented in Table 5. The statistically significant variables were limited to family labor and entrepreneurship. Farm households with more family labor were likely to participate in the contract farming. The labor intensive nature of gherkin production and the extremely low opportunity cost of household labor, especially female labor in the area, would have prompted these households to join the contract farming. Entrepreneurial inclination of farmers measured in terms of risk preference, innovativeness, and opportunity seeking was highly significant implying that the entrepreneurially inclined farmers were more likely to participate in gherkin contract farming. This could be due to the fact that in a resource constrained environment given few opportunities for the rural small farmers, the entrepreneurial farmers were likely to positively exploit the rare opportunities available to them. As a whole, the resource endowments were not decisive factors influencing farmer participation. However, resource

endowment variables such as land ownership, credit constraint, and non-farming income were negatively associated with the participation, though not statistically significant implying the tendency of better off farmers to keep away from contract farming.

6. Impact of participation on farming income

The above-mentioned second stage regression analysis included variables such as a dummy variable for participation, household characteristics (age, education, and family labor), farm management factors (area cultivated, agricultural assets, draft animals, farm record keeping, and tractor usage), and the inverse Mills ratio. As shown in Table 6, the F test for the regression is highly significant with an adjusted R^2 of 0.46. The inverse Mills ratio was not significant, indicating that there was no selection bias. The explanatory variables such as area cultivated, participation in contract farming, education, and agricultural asset (value) were statistically significant. Education was significant and had a negative coefficient, indicating the trend of educated household heads moving away from farming. Agricultural asset (value) was significant, probably

because more agricultural assets are associated with greater farm productivity.

By participating in the contract farming the sample farmers could significantly increase their farming income. For instance, on average the participant farmer cultivating 0.22 ha of gherkin (average area of gherkin production) is able to increase the gross farming income by Rs 41,488 per cultivation and the net farming income by Rs 23,578²⁾.

Furthermore, although the total net farm profit for each farm household was not possible to calculate due to lack of data on management cost for all the crops grown by farm households, it can be seen that the non-participant farmers earn higher net profit from paddy and vegetables compared to the participant farmers (Table 7). On average, the participant farmers earned a total net profit of Rs 31,486 for their own production factors, of which the substantial proportion (76%) came from the gherkin crop, while the non-participant farmers earned a net profit of Rs 15,128 for their own production factors. Hence, there was a significant difference in net profit (nearly twice) from farming between the participant and non-participant

Table 5. Result of analysis on determinants of participation in contract farming

Variables	Coefficient	Std. error	Variables	Coefficient	Std. error
Age of household head (years)	0.033	0.022	Coconut land owned (>0.5 ha=0)	0.109	0.501
Education level of household head (years of schooling)	-0.009	0.077	Credit constraint (yes=0)	-0.968	0.629
Family labor (adult equivalents)	0.314*	0.186	Non-farming income (Rs)	-0.001	0.001
Entrepreneurship	0.812***	0.188	Distance to main road (km)	-0.168	0.112
Arable land owned (ha)	-0.285	0.185	Constant	-9.142	2.746
$\chi^2=54.178$, Significance=0.00, and Sample size=79					

Source: Result of author's analysis (2003).

Note: * significant at the 10% level, *** significant at the 1% level.

Table 6. Result of regression analysis on impact of participation in the contract farming

Variables	Coefficient	Std. error	Variables	Coefficient	Std. error
Dummy of participation (yes=1)	41,488.06***	10,701.36	Draft animals/ha (heads)	-205.17	201.82
Age of household head (years)	-309.62	372.61	Farm record keeping (yes=1)	-5,180.45	9,577.45
Education level of household head (years of schooling)	-2,957.05**	1,376.51	Tractor usage (yes=1) ⁺	1,938.77	9,045.88
Family labor (adult equivalents/ha)	2,669.84	3,428.55	Inverse Mills ratio	-9,249.56	8,943.29
Area cultivated (ha)	35,750.71***	6,599.85	Constant	18,691.40	23,746.68
Agriculture asset value/ha (Rs)	0.06**	0.03	Adjusted R^2 0.460, F (10,70)=7.78, Significance=0.00, and Sample size=80		

Source: Result of author's analysis (2003).

Notes: 1) ** significant at the 5% level, *** significant at the 1% level.

2) ⁺ A dummy was used for tractor usage to indicate whether a tractor was used/not used during the season.

farmers, even though both groups cultivated nearly the same area of land.

As expected, the farming income of participant farmers was higher than that of non-participant farmers and the difference was statistically significant at 1% significance level (Table 8). However, the household income did not significantly differ between the participant and non-participant farmers. Furthermore, the difference in the predicted farming income of the participant and non-participant farmers was not statistically significant, indicating that non-participation in the contract farming would not significantly affect the income level (if wealthier farmers had participated in gherkin production, their farming income would be significantly higher than non-participants, even if they had not participated in the contract farming). Besides, the predicted household income of non-participants is significantly higher than participants' predicted household income if they had not participated in the contract farming. This clearly indicates that, this contract farming has not favored the rich farmers. Besides, as we discussed earlier the resource endowments between the participants and non-participants are not

significantly difference. Thus it could be concluded that this contract farming scheme has not favored the wealthier farmers at the expense of poorer farmers.

7. Farmer-agribusiness company relationship

The relationship between farmers and the (agribusiness) industry company is one of the most important issues for the sustainability of contract farming. Despite farmer dissatisfaction over company's pricing and grading policy, the contract farming scheme has been in existence for almost ten years, indicating that the overall relationship between the industry company and the farmers is good. The relationship is discussed, herein, based on the mutual benefits derived by both the industry company and the farmers and the farmer satisfaction with the contract arrangements.

The success of the contract farming can be attributed to the mutual benefits to both the industry company and the farmers. From the industry company perspective the company is able to obtain gherkin at a lower cost compared to producing in own farm. The industry company initially started producing gherkin in its own farm but due to high cost of production arising from high labor requirement and high risk of crop failure own farm production was not economically viable. Besides, the industry company is able to have an assured supply of high quality gherkin. From the farmers' perspective, they have access to inputs, technology, and extension to produce a high value crop to assured international markets.

The results of the likert scale questionnaire used to measure the farmer satisfaction with the contract

Table 7. Net profits of major crops for average farm household

Crop	Participant	Non-participant	t-statistic	p-value
Gherkin (Rs)	23,793 (0.22)	0	—	—
Paddy (Rs)	1,929 (0.11)	5,083 (0.24)	1.65	0.102
Vegetable (Rs)	3,258 (0.09)	6,413 (0.15)	0.93	0.351
Coconut (Rs)	2,507 (0.28)	3,632 (0.39)	1.25	0.213
Total (Rs)	31,487 (0.70)	15,128 (0.78)	−3.07	0.003***

Source: Author's survey (2003).

Notes: 1) *** significant at the 1% level.

2) Values in parenthesis are areas of crop cultivated in hectares.

Table 8. Comparison of household income of participants and non-participants

Items	Participant	Non-participant	t-statistic	p-value
Farming income per season (Rs)	65,688	35,358	−3.069	0.003***
Non-farming income per season (Rs)	10,158	24,972	2.831	0.006***
Household income per season (Rs)	75,846	60,330	−1.348	0.181
Predicted farming income without participation in contract farming (Rs)	24,323 ⁺	35,118 ⁺	1.597	0.114
Predicted household income without participation in contract farming (Rs)	34,481 ⁺⁺	60,090 ⁺⁺	2.821	0.006***

Source: Author's survey (2003).

Notes: 1) ⁺ Predicted farming income is calculated by using the actual values for regression variables except participation, which is taken as zero.

2) ⁺⁺ Predicted household income is predicted farming income plus non-farming income.

3) *** significant at the 1% level.

arrangements are presented in Table 9. With regard to input supply and extension service farmers were satisfied with the arrangements made by the industry company as the mean scores were less than two (that is “satisfied”). Timely delivery of inputs and extension service is very essential to prevent crop failures in this highly sensitive crop, in our investigation none of the farmers reported crop failures as a result of the industry company’s failure to deliver inputs on time or provide extension advise. The company by maintaining field offices close to the farmer fields ensures that inputs are delivered on time and prompt extension services are provided. Besides, the company has recruited field staff particularly the extension staff from the local community to ensure good rapport with the farmers. The farmers were also moderately satisfied with payment system and the method of input cost recovery as the mean scores were only slightly higher than 2. The payment is made to the bank account of the contract farmer after recovering the input cost. Input cost is recovered in stages distributed throughout the entire production period. However, the farmers are not satisfied with price and grading, as the mean scores were nearly 3 and above 3 respectively (that is, “not satisfied”). In fixing the contract price, the farmer view is not sought; the industry company unilaterally fixes the price when the contract is finalized. As majority of farmers (73%) claim, lack of an alternative market enables the industry company to behave opportunistically, particularly during periods of good harvest by raising the quality standards to reject excess production. Besides, contract terms preclude the farmers from involving in grading of gherkins. These are evidence for the existence of strong power imbalance between the

small farmers and the industry company further confirming the findings of previous studies (Porter and Philips-Howard, 1995; Key and Runsten, 1999 and Singh, 2002). Farmer organization and groups are thought to be an important strategy to overcome such power imbalance (Little and Watts, 1994 and Porter and Philips-Howard, 1997). Though the aspects are limited, a detailed discussion of the role of farmer organizations/groups in contract management in the context of Sri Lanka is developed in our previous study (Esham and Usami, 2005).

8. Conclusion

Despite its relatively small size, the fruit and vegetable industry in Sri Lanka, appears to be using contract farming as an important means to procure its raw material requirements. The industry considers contract farming as a reliable source of raw material supply. Besides, it appears to be a good strategy to overcome seasonality and quality issues in raw material supply. Companies in the industry have a positive perception of small farmers’ ability to be contract farming partners to supply industry requirements.

The case study on gherkin contract farming revealed the following. Firstly, there was no significant difference between the participant and non-participant farmers in the resource endowments. Secondly, the contract farming favored entrepreneurial farmers having enough family labor, despite the absence of stringent selection criteria in the contract. In other words, entrepreneurial small farmers are likely to exploit any opportunity accessible to them. Thirdly, as a result of involving in gherkin production, farmers were able to earn significantly high net profit compared to other commonly grown crops such as paddy and vegetables. Besides,

Table 9. Farmers’ satisfaction with farmers-agribusiness relationship

Items for satisfaction	Mean	Std. dev.	Items for satisfaction	Mean	Std. dev.
Price paid by the company	2.90	0.51	Extension service	1.78	0.51
Quality requirement	2.14	0.41	Method of payment	2.10	0.55
Grading	3.16	0.42	Method of recovering input cost	2.14	0.36
Input supply	1.90	0.38			

Source: Author’s survey (2003).

Notes: 1) Scales are 1: highly satisfied, 2: satisfied, 3: not satisfied, and 4: not satisfied at all.

2) A mean value less than 2.5 implies that farmers are satisfied.

there was statistically significant difference in farming income between the participant and non-participant farmers. Fourthly, the gherkin contract farming has not favored the wealthier farmers at the expense of poorer farmers. Finally, there are evidence of power imbalance between the industry company and farmers, the most common criticism of contract farming found in literature.

This case study by using an econometric model proves that contract farming involving high value crop production in Sri Lanka neither favors the large farmers nor creates income disparity between participant and non-participant farmers even in the absence of farmer organizations/groups in contrast to the findings of previous studies in developing countries (Korovkin, 1992; Little and Watts, 1994 and Key and Runsten, 1999). Furthermore, this study empirically confirms the importance of rural entrepreneurship to enhance small farmer participation in contract farming. To redress power imbalance between the farmers and the industry, the role of farmer organizations/groups in contract management in the context of Sri Lanka will be an important area for further study.

Notes

- 1) A list of farmers who have participated for more than 5 seasons was obtained from the company and a random sampling technique was used to select the contract farmers. In case of the non-participant farmers, the sample was randomly selected from the voting list of the sample villages.
- 2) Total cost of production per 0.22 ha is Rs 17,910 ($81,407 \times 0.22$) and the net profit is Rs 23,578 ($=41,488-17,910$).

References

- [1] D. Dunham, *Contract farming and export horticulture: Can agribusiness revitalise the peasant sector in Sri Lanka?*, IPS Agricultural Policy Series No. 3, (Colombo: Institute of Policy Studies, 1995), pp 34.
- [2] F. Echanove and C. Steffen., "Agribusiness and farmers in Mexico: the importance of contractual relations", *The Geographical Journal* 171(2), (2005), pp. 166–176.
- [3] R. Epaarchchi, S. Jayanetti and A. Weliwita, *Policies and their implications for the domestic agricultural sector of Sri Lanka: 1995-2000*, (Colombo: Institute of Policy Studies 2002), pp. 2.
- [4] M. Esham, K. Usami, H. Kobayashi and M. Matsumura, "Determinants of farmers' participation in farmers-agribusiness linkage and its implication for income distribution in Sri Lanka—A Case Study of Hybrid Maize Production", *Journal of Rural Problems* 41(1), (2005), pp. 200–205.
- [5] M. Esham and K. Usami, "Present state and issues of farmers-agribusiness linkages through farmer organization/group in Sri Lanka: A Case Study of Hybrid Maize Production", *Journal of Agricultural Development Studies* 16(2), (2005), pp. 27–36.
- [6] D. Glover and K. Kusterer, *Small farmers, big business—contract farming and rural development*, (London: Macmillan, 1990).
- [7] N. Key and D. Runsten, "Contract farming, smallholders and rural development in Latin America: the organization of agro-processing firms and the scale of out grower production", *World Development* 27(2), (1999), pp. 381–401.
- [8] T. Korovkin, "Peasants, grapes and corporations—the growth of contract farming in a Chilean community", *The Journal of Peasant Studies* 19(2), (1992), pp. 228–254.
- [9] Little, Peter D. and M.J. Watts, *Living under contract: Contract farming and agrarian transformation in Sub Saharan Africa*, (Madison, Wisconsin: The University of Wisconsin Press, 1994).
- [10] G. Porter, and K. Phillips-Howard, "Farmers, labourers and the company: Exploring relationships on a Transkei contract farming scheme", *The Journal of Development Studies* 32(1), (1995), pp. 55–73.
- [11] G. Porter, and K. Phillips-Howard, "Comparing contracts: an evaluation of contract farming schemes in Africa", *World Development* 25(2), (1997), pp. 227–238.
- [12] P.A. Puhani, "The Heckman correction for sample selection and its critique", *Journal of Economic Survey* 14(1), (February 2000), pp. 53–68.
- [13] L.T. Raynolds, "Negotiating contract farming in the Dominican Republic", *Human Organization*, 59 (2000), pp. 441–451.
- [14] K. Sartorius, J. Kirsten and M. Masuku, A new institutional economic analysis of small farmer contracts and relations in the sugar supply chains in South Africa and Swaziland, A paper presented at IAMA annual conference in Mexico, (2003).
- [15] S. Singh, "Contracting out solutions: political economy of contract farming in the Indian Punjab", *World Development* 30(9), (2002), pp. 1621–1638.
- [16] M. Warning and N. Key, "The social performance and distributional consequences of contract farming: An equilibrium analysis of the Arachide de Bouche program in Senegal", *World Development* 30(2), (February 2002), pp. 255–263.
- [17] J. Weerahewa, *Impacts of trade liberalization and market reforms on the paddy/rice Sector in Sri Lanka*, Discussion paper No. 70, (Washington: International Food Policy Research Institute, 2004).
- [18] C. Winship and R.D. Mare, "Models for sample selection bias", *Annual Review of Sociology* 18, (1992), pp. 327–350.