Contract Farming through Tea-Horticulture Intercropping System: A Case Study of Gambung Estate and Horticultural Farmers in Bandung, Indonesia

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ABSTRACT

Contract farming is becoming a viable form of partnership between tea plantation companies and local farmers in the management of tea plantations. This study aimed to: (1) describe a contract farming pattern through the system of intercropping tea-horticulture, (2) analyze the efficiency of the management of tea garden with contract farming, and (3) describe the benefits and sustainability of the contract farming between Gambung Estate and horticultural farmers. The case study was conducted in Gambung Estate using qualitative descriptive analysis and contract farming scheme analysis. The study observed that the contract farming patterns applied was a modified nucleus estate model with a combination of resource provisioning cooperation with production management cooperation. The challenges for future contract farming include land management, new skill transfer, climate change, and shared risk and effort between the two parties so that the bargaining position of horticultural farmers will be increased in the sustainable tea plantation management framework. Value of investment efficiency was 47 percent for new planting and 49 percent for replanting. The highest R/C and B/C values were given to the intercropping system of tea-chili at 2:25 and 1:25, respectively.

Keywords: partnership, contract farming, intercropping, tea, horticulture
JEL Classification: Q130

INTRODUCTION

One of the biggest challenges in national tea plantation development in recent years is the low level of productivity and efficiency of tea production (Brouder 2014). Moreover, the continuing decline in world tea prices and the application of 10 percent value added tax (VAT) aggravated loss in income and interest in tea production. This is shown by the increasing conversion of tea lands into palm oil plantation or horticulture by tea entrepreneurs and farmers because it gives more income and profit (Lee 2014; Kinaya 2014).

It requires a breakthrough strategy to maintain the existence of the national tea plantations, given their strategic role in the development of the national economy. Contract farming is one of the breakthroughs in the mechanism of management of tea plantations, especially for tea plantation companies that have limited resources. Another benefit from contract farming is that local farmers living near the tea plantation are empowered by land use optimization, cooperation, and rural labor supply.

Eaton and Shepherd (2001) define contract farming as collaboration between farmers and processing companies or marketing entities to produce or supply agricultural products. This is followed by an agreement that includes the terms and conditions relating to price and production (e.g., provision of inputs, technological assistance, and quantity and quality of product). Contract farming is also a form of investment that is fully vertically integrated in the value chain of agricultural commodities (Kirsten and Sartorius 2002; Young and Hobbs 2002; Da Silva 2005; Prowse 2012; Vermeulen and Cotula 2010).

In general, there are five types of contract farming (Baumann 2000; Eaton and Shepherd 2001; Bijman 2008), namely, centralized models, nucleus estate models, multipartite models, informal models, and intermediary models. Contract farming can help increase agricultural productivity, improve the welfare of poor rural farmers, and play a role in preventing rural exodus (UNIDROIT, FAO, and IFAD 2015), increasing the efficiency of plantation companies and farmers through better coordination, lower overhead costs, and improved value chain (Baumann 2000; Saes 2005; Prowse 2012; UNIDROIT, FAO, and IFAD 2015).

Contract farming can be adopted in the management of tea gardens during the young tea period (immature) through intercropping with horticultural crops in cooperation with horticultural farmers. In general, tea plantations are managed using monoculture cropping or intercropped with annual crops, which also functions as protection for tea plants, also known as shade trees.

Intercropping of young tea with vegetable plants has long been practiced in tea plantations in Indonesia. However, the practice of intercropping in a contract farming scheme has been discouraging because it resulted to conversion of some tea plantations to cultivation of other commodities. Thus, while intercropping has been a strategy to optimize land use and empower communities to maintain tea plantations, it has also negatively affected the business of tea production. Such model exists in Gambung Tea Estate, where there is a unique contract farming system with few horticultural farmers living near Gambung Estate. This agreement was made because the areas surrounding the estate have been experiencing developments in horticulture.

The intercropping system is a system of planting two or more types of plants in the same area of land at one time. Previous studies have noted that an intercropping system with horticultural crops can increase the growth of tea plants, production of tea shoots, and revenues and profits for farmers (Baruah, Ahmed,

and Sulkia 2005; Waheed et al. 2007; Sedaghathoor and Janatpoor 2012). Moreover, it can reduce the cost of fertilizing and weeding (Research Institute for Tea and Cinchona, 1994; Janatpoor 2004 in Sedaghathoor and Janatpoor 2012). The challenge in intercropping is the competition for limited resources between or among the plants, which in turn will affect production (Joseph et al. 2009). The characteristics of intercropping plants that can be cultivated are those that do not excrete allelopathic substances, have more shallow roots, do not cover the tea tree, and do not require tillage to a depth of more than 15 cm (Research Institute for Tea and Cinchona, 1994).

Thus, this study aimed to: (1) describe the business partnership pattern between estate and farmer under contract farming through tea–horticulture intercropping systems, (2) assess the efficiency of the tea plantation management under contract farming partnership, and (3) describe the benefits and sustainability of tea–horticulture intercropping systems under the contract farming pattern.

METHODOLOGY

This study used descriptive qualitative research approaches. The research area was located in the Gambung Tea Estate in Pasirjambu Subdistrict, Bandung Regency, West Java, Indonesia. It was managed by the Indonesia Research Institute for Tea and Quinine (IRITC), which had a contract between estate and horticultural farmers to employ tea-horticulture intercropping system. Data collection was conducted from August 2014 to July 2015, which was the equivalent of three growing seasons. The respondents were horticulture farmers who were also partners in the management of the young tea plants in the Gambung Tea Estate—the Field Manager of the North Afdeling Gambung Estate and the General Manager of Gambung Estate itself.

The farmers who became respondents through the census method were the only two horticultural farmers in the Gambung Tea Estate who were engaged in contract farming. These two became partners with the tea estate because of their prior experience in managing tea plantations under a tea–horticulture intercropping system, notably on capital and the market. The estate also had a good working relationship with the estate and local government. The number of farmers who utilized tea–horticulture intercropping was limited to the available area at the time. This area was in turn adapted to the replanting or rejuvenation program of the tea plantation.

Both farmers were still in their productive age (45–50 years old), with horticultural farming as their main source of income. They both graduated from senior high school, specializing in agriculture, and had more than 20 years of experience in horticultural farming utilizing either monoculture or polyculture system. Horticultural farming produces an average monthly income of about IDR 15–20 million during profitable times, excluding repayment of a 30 percent loan. However, this can fall to an average of about IDR 5–7.5 million or to as low as zero income.

Primary data were gathered through in-depth interviews and direct observation in the field. Among those observed were the partnership itself (patterns, benefits, and sustainability of the partnership), horticultural farming, investment data during young tea period, and tea plant agronomy (stem diameter, branch number, and tea plant height before centering or bending). Secondary data were retrieved through the study of literature and documentation sources such as other studies associated with this research.

Types and characteristics of contract farming were analyzed qualitatively using

the contract farming scheme (Smalley 2013). On the other hand, factors such as benefit cost ratio, cost efficiency analysis of intercropping system between tea-horticulture, and other economic aspects were analyzed only to support the qualitative description analysis.

RESULTS AND DISCUSSION

Pattern of Contract Farming Partnership

Gambung Estate has been known to establish cooperation in partner contract farming among horticultural farmers since August 2014, which was also the initial trial before the issuance of the decision in writing that established its legal framework. The legal framework was issued on January 5, 2015 through Contract Farming Agreements No. 005. PPTK.I.2015 on Land Use for Intercropping Activities Between Tea or Quinine with Horticultural Crops, Gambung-Bandung (Research Institute for Tea and Cinchona 2015).

Contract farming patterns are modified versions of the nucleus estate models. They are a combination of resource provision cooperation contracts and production management cooperation (Rustiana et al. 1997; Baumann 2000; Eaton and Shepherd 2001; Bijman 2008). They are a combination of resource provision cooperation contracts and production management cooperation (Rustiana, Sjaifudian, and Gunawan 1997; Baumann 2000; Eaton and Shepherd 2001; Bijman 2008) as seen in Figure 1. The technology applied in contract farming was tea–horticulture intercropping system. The type, characteristics, and components of the contract farming patterns are explained in Table 1.

In establishing contract farming with horticultural farmers, Gambung Estate applied certain preconditions for prospective partner farmers. Apart from the social security aspects, it also determined the ability of partner farmers in controlling the means of production capital. As Glover and Kusterer (1990) noted, the practical involvement of farmers who had access to the control of the means of production was profitable for the institution/company. This was because partner farmers who were considered to be more innovative to new technologies have had access to financial institutions (for credit needs), had access to sources of information and power, and had efficiency of investment for the institution/company in terms of building relations of production and human resources.

The partnership principle implemented was the principal-agent relationship, i.e., a relationship where one or more persons act as a conduit of trust (called the principal) to influence others as partners to receive the trust (called the agent) to carry out some tasks delegated by authorities (Nugroho 2006).

Figure 1. Contract farming as vertical integration

Degree of vertical integration				
← Market	Chain coordination			→ Vertical integration
Open market	Buy and sell agreement	Contract farming	Management contract	Fully combined land and production

Source: Adapted from Vermeulen and Cotula (2010, Table 3.2)

Table 1. Characteristics and components of contract farming schemes

Type	Characteristic	Component
Contract	a. Verbal contract or oral legal framework (initial trial)	• Cabbage as the horticultural crop in the first intercropping (intercropping commodity determined by farmers)
	b. Verbal contract transformed to written contract after positive intercropping performance growth	• Long trial contract for half a year (August–December 2014) • Cultivation of horticultural crops planted after tea is grown on the land
	c. Written contract/legal framework published in January 2015	• Long-term contract to be evaluated each year • Farmers select horticultural crops that are compatible for intercropping with tea
Source input/output in contract farming	a. Input–output for partner (farmers)	• Input: land; young tea plant; assistance maintenance period in years 1 and 2 for young tea management (centering/bending for tea plucking table formation); and regular monitoring based on the rules of tea agronomy • Output: No share on revenues or losses of farming; income and losses fully owned or the risk of farmer, but farmer guarantees the readiness forming on tea plucking table and tea plant ready for harvesting period
	b. Input–output for Gambung Estate	• Input: Maintenance labor; fertilizer; pesticide; tea plant for infilling • Output: Tea plant ready for harvest period in target two years farming
Participation	Criteria for partner farmer participants in contract farming	• The partner farmers must have skill, experience, and commitment under intercropping system • Selection of partner farmers based on the results of the social process of analyzing the risks of social conflict with local communities • Farmer must have network on capital, information, and market for horticultural products
Land	Utilization of land for contract farming	• Land use rights covers replanting of tea specifically in areas with young tea plants (i.e., Block areas A1, A2, and A9) • Maximum land area that can be replanted under contract farming is 18 ha, gradually managed by farmers • Farmers do not charge land rents • Farmers guarantee and preserve the environment of intercropping land
Scale	The expansion of contract farming	• Under contract farming, land is owned by Gambung Estate, Research Institute for Tea and Cinchona Indonesia, which is located in North Afdeling • The sharing scheme is calculated from the mature tea produce prior to harvesting • Expansion contract farming area is on quinine land management

Source: Analysis of primary and secondary data (2015) by adopting Smalley (2013)

Efficiency of Tea Plantation Management under Contract Farming

Partner farmers applied the cropping pattern early by planting cabbage from August to December 2014 (five months), followed by red chili from January to June 2015 (six months). Farmers chose cabbage plants at the beginning of the management on the basis of two main considerations: (1) it could improve soil fertility, and (2) its production cost was less than that of red peppers or tomatoes such that losses were lower in case of failure in intercropping tea with vegetables. Table 2 presents the results of analysis of vegetable farming in tea–vegetables intercropping systems through a contract farming partnership between estate and horticulture farmers.

Table 2 shows that red chili gave high values on revenue/cost (R/C) and benefit/cost (B/C) ratios, at 2.25 and 1.25, respectively. This shows that the cultivation of red chili using the intercropping system was profitable. Cabbage also demonstrated the feasibility of farming in the intercropping system, although its contribution to the value of R/C and B/C was lower than that of red chili.

The market selling price provided a substantial contribution to the farm income. Under favorable market conditions, the selling price of red chili could reach from IDR 20,000 (USD 1.49) per kg to IDR 30,000 (USD 2.23) per kg, while that of cabbage could reach from IDR 3,000 (USD 0.22) to IDR 4,000 (USD 0.29) per kg. However, if horticultural market conditions were poor, the farmer would have losses even if vegetable commodities did not have a high sale value. In red chili for example, partner farmers had a market partner that would give a high selling price according to the quality grade production of the red chili produced under favorable market conditions. After cooperating with Gambung Estate, the overall income of farmers in profit/year increased by 100 percent to 200 percent, especially from red chili, which had a selling price of normal to high value.

Based on the outcome of contract farming of tea-horticulture intercropping, not only was there a reduction from three to two years in the management of young tea plants, but there was also efficiency of maintenance costs during the young tea period. Therefore, in the management of young tea, investments for four years could save up to 47 percent for a tea planting program

Table 2. Analysis of intercropping farming period from August 2014 to July 2015 (in IDR) in Gambung Tea Estate

Item	Intercropping with Cabbage (1 ha) August–December 2014	Intercropping with Chili (1 ha) January–June 2015
Material (IDR)	21,412,500	99,830,000
Labor (IDR)	5,675,000	33,500,000
Production Cost (IDR)	27,087,500	133,330,000
Production Result (kg)	30,000	20,000
Selling price (IDR/kg)	1,000	15,000
Income (IDR)	30,000,000	300,000,000
Profit (IDR)	2,912,500	166,670,000
Revenue/Cost (R/C)	**1.11**	**2.25**
Benefit/Cost (B/C)	**0.11**	**1.25**

Table 3. Tea plant investment

Item	New Planting Cost (IDR)	Replanting Cost (IDR)	Young Tea Management Cost (IDR)		
			Year 1	Year 2	Year 3
Labor	13,790,000	8,435,000	9,520,000	8,330,000	4,620,000
Materials and Tools	48,246,000	48,556,100	9,763,500	9,583,500	3,200,500
Sum	62,036,000	56,991,100	19,283,500	17,913,500	7,820,500

Source: Primary data (2015)

Notes: The amount of investment for new planting + young tea= IDR 117,053,500
The amount of investment for replanting + young tea= IDR 112,008,600
The amount of investment for Young tea= IDR 55,017,500
The proportion cost for young tea in new planting= 47 percent
The proportion cost for young tea in replanting= 49 percent

and up to 49 percent for a tea replanting program. The data on tea plant investment and the proportional efficiency during the young tea period are presented in Table 3.

Apart from the aspect of cost efficiency, tea–horticulture intercropping system under the contract farming pattern also contributed to the tea plant performance based on agronomic characteristics, namely, stem diameter, number of branches, and plant height. Table 4 presents the average diameter of the stem base, the number of branches, and tea plants' height among the tea plants in intercropping and those in monocropping.

It can be seen in Table 4 that the average diameter of the tea plant stem base in gardens with intercropping was larger than the diameter of those in gardens with no intercropping system. This is also true for the number of branches and for tea plant height. Tea plants in the intercropping system also showed better growth than tea plants in garden with no intercropping system, respectively, as seen in Figure 2.

Figure 2 showed that the tea–horticulture intercropping system under contract farming, amid lack of capital investment during the young tea investment period, might have had a positive impact for the growth of tea plants. This is because the inputs for the tea plant in intercropping with horticulture were more available than those that were not in intercropping (monoculture) given the nature of intensive cultivation of horticultural crops. A similar result could be found in the study of Joseph et al. (2009). It stated that the challenge to intercropping is the competition for resources, such as crop nutrients that are derived from fertilization; however, the practice can still provide good performance for tea plants.

Table 4. The average stem diameter, number of branches, and tea plant height per plant per area intercropping tea–horticulture in August to June 2015

Cropping Pattern	Stem (mm)	Number of Branches	Tea Plant Height (cm)
Single row chili	18.42	11	90.75
Double row chili	11.47	7	88.00
Control	15.18	4	46.33

Source: Primary data (2015)

Figure 2. Difference of tea plant intercropped with horticulture and not intercropped (monoculture)

Intercropped

Monoculture

The Sustainability Benefit and Business under Contract Farming

Binswanger and Rosenzweig (1986) argued that the combination of technology and the characteristics of the plant give rise to a situation where contract farming is the most viable option. It was based on the premise that a plant with important economic value to the scale is associated with an intensive process of coordination between the parties under contract farming. Perennials require a lot of care and are time-consuming to produce. This is why commodities such as tea, cocoa, coffee, rubber, and palm oil should be grown under contract.

The partnership between Gambung Estate and horticulture farmers through contract farming provided opportunities and potential benefits for both parties (Table 5). For the Estate, tea-horticulture intercropping under contract farming improved cost efficiency of tea farms and accelerated the maturity of tea plants. On the other hand, farmers benefitted from cost efficiency of land and increased income from horticulture.

Contract farming through tea-horticulture intercropping system also had weaknesses and potential problems, especially for farmers that still had low benefit in bargaining position from this contract (Table 5). A potential problem for the estate was when it had to expand to include the participation of other partner farmers who were vulnerable to social pressure such as unfair competition based on capability and competence of horticulture farmers in management of tea and other crops. Additionally, there was the potential for weak oversight of maintenance during the young tea period by partner farmers.

For partner farmers, the main area of concern was the risk of loss in farming caused

Table 5. Benefits and potential problems in contract farming for the estate and for farmers

Actor	Benefit	Potential Problem
Estate	• Efficiency in young tea maintenance cost • Efficiency in young tea labor cost • The acceleration time period of young tea age to two years from three years • Expansion of income for horticultural farmers • Transfer of production risk to farmers' partners	• Competition between horticultural farmers around Gambung Estate to become partners in contract farming • Weak supervision and assistance to the intercropped tea plants
Farmer	• Efficiency in land rent cost • Technology transfer and direct technical assistance • Expansion of income for the family and the family of farming laborers	• Sustainability of contract farming after replanting program is completed • Failure in the management of production risks (climate stress, pest and disease attack, and fluctuation of market prices for horticultural products)

by climatic factors, cultivation system, pest and disease attack, and horticultural market. However, under contract farming, there was no risk shared between the two partners. In addition, the potential risk of loss could also be caused by the intercropping cultivation system as only one type of horticultural crop was planted. In case of problems in farming, the farmers would have difficulty avoiding the risk of losses during the growing season, a risk that is fully borne by partner farmers. This potential problem needs to be taken as a challenge in planning and improving the contract farming scheme in the future.

The issues that should be addressed by the actors of contract farming are the sustainability of future contract farming undertakings. For the estate, the challenge is how to manage a post-contract farming tea garden and how to start new contract farming for farmers, i.e., when the young tea period transitions into the tea harvesting period. For farmers, the challenge is how to make contract farming in the young tea management sustainable when the period, which is temporary by nature, has been completed. Here, farmers are faced with the task of finding land resources in other areas for cooperation or for contract. Another challenge is how to reduce risk through greater sharing of risk between parties so that it will improve the bargaining position of horticultural farmers in sustainable tea plantation management. An example would be through collaboration in input supply (bio-fertilizer or bio-pesticide from tea plantation waste) and through collaboration in horticultural product marketing of tea "edu-eco-tourism" packages.

CONCLUSIONS

Based on the preceding discussion, it can be observed that the contract farming partnership that applied between Gambung Estate and horticultural farmers was a modification of the nucleus estate model with a combination of resource provision cooperation contracts and production management cooperation. The provision of production resources came in the form of land for horticultural farming, while production management was in the form of assistance in the maintenance of the tea plant during the young tea period.

The challenge for future contract farming through intercropping system between both parties (estate and farmers) is sustainability for production and the environment, which gives mutual benefits. These include land management, new skills transfer, and climate change. Another challenge is how to increase the sharing of risk between the two parties so that the bargaining position of horticultural farmers will be increased in sustainable tea plantation management framework. This can be addressed by collaboration, i.e., cooperation in supply of farming green inputs and cooperation in the horticultural product market on tea "edu-eco-tourism" packages. It requires high coordination and risk sharing management efforts between estate and farmers, which can be considered as prospective measures for the future.

From the economic analysis of contract farming through tea–horticulture intercropping system, Gambung Estate can generate efficiency in investment costs for the young tea period of three years. This gives savings of 47 percent of the investment cost for the tea new planting program and 49 percent of the investment cost for the tea replanting program. In addition, there is improved efficiency during the young tea period, which usually shortens three or four years into only two years with good tea growth performance. For farmer partners, partnership in contract farming can provide farming benefits, especially when tea is intercropped with chili, which yielded high revenue/cost and benefit/cost ratios of 2.25 and 1.25, respectively.

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