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The Sustainability of Contract Farming with Specialized Suppliers to Modern Retailers: Insights from Vegetable Marketing in Indonesia

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Abstract: Specialized suppliers to supermarkets in rural Java showed that smallholder farmers could engage in contract farming with the rise of retail modernization. This paper examines whether they have sustained contract farming with the recent decline of modernized stores. Our field survey, based on cases reported by the World Bank in 2006, provides the following findings: (1) Some suppliers failed to sustain contract farming due to growers' hold-up problems; (2) The suppliers could prevent contract breaching by either undertaking contract-specific investments to train growers or provide inputs. Moreover, they selected growers based on their social reputation to avoid contract breaching; (3) We found that farmers in breach of contract farming on the modern channel begin to arrange farmers' groups by themselves and return to the traditional channel as a new type of intermediaries. This indicates an evolution of the traditional marketing channel with the supermarket revolution.

Keywords: supermarket revolution; contract farming; hold-up problem; Java

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1. Introduction

Contract farming with modern retailers is expected to be a key tool for smallholders to participate in value-adding activities and escape poverty in developing countries [1–4]. As counterparts of the smallholders in contract farming, supermarkets arrange the contract farming scheme to provide advanced technologies (high-quality seeds and fertilizers and appropriate farming techniques) to smallholder farmers who can participate in the value chains and obtain higher wealth than selling to traditional markets. Since agricultural commercialization under the rapid globalization and liberalization of markets in developing countries is regarded as a vital strategy for improving the welfare of smallholders [5], numerous research papers explore how smallholders join the value chains and the welfare impacts on them [6–8].

In general, individual farmers face difficulties engaging in contract farming due to market failures (e.g., lack of access to formal financial and insurance markets; information uncertainties related to growing high-value commodities [9]). The smallholders under market failures tend to fail at contract farming due to the lack of legal enforcement of contracts observed in developing countries [10–12]. To solve such a coordination problem among farmers and supermarkets, the importance of forming producer organizations or marketing cooperatives including smallholders is well recognized [9,13,14]. The producer organization provides, for example, access to appropriate technology for supply of high-value commodities to supermarkets [9,14,15]. Moreover, supermarkets could expect that the producer organizations reduce transaction costs incurred by assembling the commodities from a large number of smallholders; thus, the role of producer organizations could guarantee a minimum quantity of commodities in contracts [9,13,16].

Whereas the organizational approach seems to be effective, the impacts of contract farming on the welfare of smallholders are still unclear and depend on the regional contexts [6,8,17,18]. Thus, contract farming may not be suitable for some regions at present. For instance, smallholders who engaged in and breached contract farming in Thailand incurred spillover effects that triggered the dissemination of new species of vegetables into the traditional market [19]. Therefore, the sustainability of contract farming and its consequences currently depend on regional contexts. In other words, a comprehensive understanding of the modern agricultural format by its successes and failures is needed. However, few studies have focused on how smallholders breach contract farming and return to alternative marketing formats in the areas where contract farming was introduced.

In Indonesia, modern retailers' penetration into national markets has changed the midstream and upstream sections of agricultural marketing since the early 2000s, together with China, Thailand, and Malaysia [20]. Focusing on the market participation of smallholder farmers in modern channels via contract farming, promoting the producer organization of smallholders is an effective strategy [21]. Although we can observe such organizations, an intrinsic actor to intermediate farmers and modern stores emerged in Indonesia and Central America [22–24]. As the actor, specialized suppliers to modern retailers (hereafter "SS") perform the centric intermediators for introducing contract farming in these areas. As a significant example, the partnership between Bimandiri (categorized as a SS) and Kelompok Usaha Bersama Mandiri (a farmers' group) was an attractive model to promote contract farming in Indonesia [23]. Moreover, at the early stage of supermarket penetration in Indonesia, the World Bank [25] illustrated a blueprint for future industrialized agriculture. However, the growth of modern retail stores has begun to deteriorate since 2016 [26]. While changes in consumer demands might have caused this phenomenon, it also suggests that the unique scheme faced difficulties in terms of the revival of traditional markets [27] (note that based on the procurement behavior of urban consumers, they prefer to buy vegetables from traditional stores rather than modern stores; even if conservative predictions are applied, the proportion of modern stores is less than 40%) [28].

Despite the rapid changes in the retail sector, the existing studies in contract farming [18,29] have thus far paid relatively little attention to this facet of the sustainability of contract farming in Indonesia. Therefore, this study aims to clarify transitions of contract farming introduced by SS and especially whether they have sustained contract farming based on their follow-up interviews which were reported by the World Bank [25]. As complementing the study of [27], this study contributes to providing an alternative interpretation of introducing contract farming in Indonesia as a trigger to enhance smallholders' capability to obtain higher values from market participation.

2. Materials and Methods

2.1. Key Literature on Enforcing Contract Farming

In exploring the determinants of sustained contract farming in Indonesia, we use insights from a contract economics' approach because we focus on the contractual relationship between SS and farmers as an economic coordination problem. Failures of contract enforcement among them trigger breaching of the contract [30]. If incomplete contracts are made under nonlegal enforcement mechanisms, both SS and farmers face the risk of contract breaching, that is, a hold-up problem. Since utilization of the courts as the enforcement system in developing countries incurs prohibitively high costs, vertical integration of both parties or contractual arrangements is well observed to reduce such coordination costs [9,31–33]. The producer organization is a hopeful solution to reduce coordination costs through the collective action of farmers and to mitigate the risk of contracts being breached. However, in the context of Indonesia, SSs for trading with supermarkets support linking such producer organizations to supermarkets [23]. Therefore, the prospective model in this paper is a typical contract setting between a farmer (or a farmers' group) and an intermediary. The setting was well studied and summarized by Swinnen et al. [34].

Before explaining the theoretical perspectives, we define contract farming based on the classification of MacDonald and Korb [35]. Here, we consider a production contract that uses agreements in the production process between farmers and contractors, who provide inputs or financial access. There is another type of contract farming, a marketing contract, which is the agreement of exchange for commodity sales, such as the price, volume, and timing of delivery. Because contract farming in Java described by the World Bank [25] mainly illustrated the production contract, "contract farming" refers to the production contract.

2.2. Theoretical Perspectives for Sustaining Contract Farming in Java

In the simple contract model, we assume that a buyer (SS) invests specific inputs or training for producing upgraded vegetables for a seller (farmer or representative of the farmers' group) at the first stage of contract farming. Next, the seller decides whether he or she keeps a contract while bringing products to the buyer or selling them to wholesalers in traditional markets (note that we focus on the feasibility of contract farming by avoiding side-selling behavior by farmers, not by input diversion since this is rarely found in our field, e.g., growing subsistence crops by using the inputs or directly selling them. The case of input diversion was analyzed by Swinnen et al. [34] (pp. 256–268)). The latter behavior is side-selling; it can be observed in our field, as described later. This decision-making of the seller depends on the payoff from the two behaviors. If the profit for the seller from securing the contract is lower than the profit from selling products to alternative buyers who do not account for the specific costs, the seller has an incentive to side-sell. In addition to the SS, alternative buyers in traditional markets may provide relatively higher bids for products when the quality grade of vegetables is evaluated in markets, as observed in advanced vegetable markets in West Java [36]. Opportunistic behavior by the farmer leads to a hold-up problem that causes underinvestment of the buyer and will lose potential benefits for both sides. For instance, the buyer is afraid of dishonest behavior of the seller in this setting because it is simply assumed that the buyer rationally expects the result of the contract, which leads to underinvestment by the buyer. Consequently, both sellers and buyers miss a chance to improve their welfare if they commit to their agreements.

Here, we present three hypotheses based on the above theoretical setting in Swinnen et al. [34] to explain what kind of factors can hamper contract enforcement. First, we directly expect that offering higher bids in traditional markets that compete with those of SS would enhance the side-selling of the contracted growers. In the context of competitive vegetable markets around West Java, wholesalers in the traditional channel would be attractive buyers for growers. The hypothesis may be supported by the upward trend of the traditional wholesale price confirmed by Figure 1 (note that the price trend represents the market condition in Java since we obtained the data from a central wholesale market for vegetables in Jakarta (Kramat Jati wholesale market)). Second, low enforcement costs for sustaining contracts would provide incentives to breach contracts for farmers. The farmer who breaches the contract can obtain excess profits but loses his or her social reputation, which holds higher values in the solid rural agrarian community. Thus, if contracted farmers belong to such a rural community, contract breaching can be prevented. Third, the variety of buyer investments for compensating the costs of growers' production activities determines the probability of sustaining contract farming. For instance, investment of training costs required for improving production skill would maintain the contract, compared with the investment of costs regarding input provision, because investment of the training costs is incurred at the first round of the contract and decreases as the contract is repeated, while the latter investment costs are constant for each repeated contract. Therefore, buyers who invest in training costs would gradually increase their pay-off or increase procurement prices for the farmer; thus, the contract would likely be sustained (note that the extent of profits for the alternative buyer is also a determinant of each pay-off; however, both costs have a similar effect on profit, thus, such an effect is not considered here). In addition, Swinnen et al. [34] investigated two additional types of contract-specific investment costs

for buyers: search costs and monitoring costs. We do not explicitly consider them because the two costs are not the main components of investment from SS in our cases.

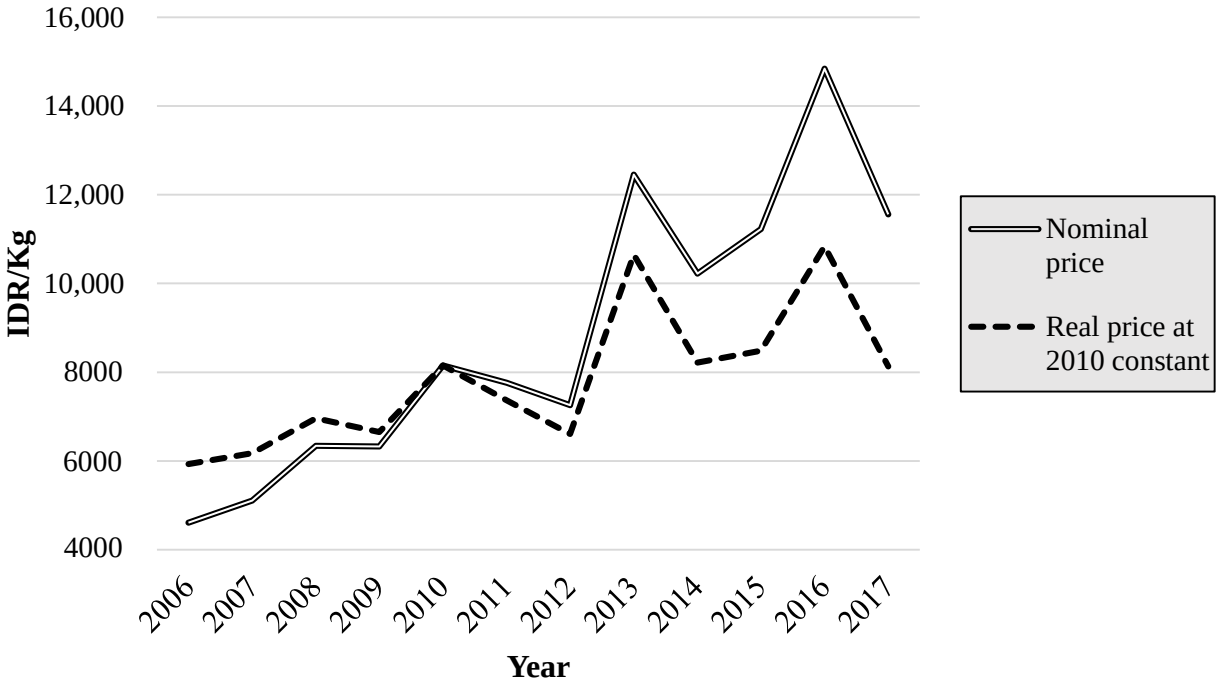

Figure 1. Trends of wholesale market prices in Jakarta in 2006–2017. The daily price data of eight main commodities (Chili, Cabbage, Red onion, Tomato, Potato, Carrot, Eschalots, Wombok) were obtained from an officer of the Kramat Jati wholesale market. Note that we calculate the yearly average price as total sales of the eight main commodities divided by the total amounts each year. The real price is derived by using the World Bank CPI (https://data.worldbank.org/indicator/fp.cpi.totl?end=2017&start=1960&view=chart, accessed on 1 May 2019). IDR is an abbreviation of Indonesia Rupiah. The average exchange rate for the recorded period is 10,723 IDR for 1 US dollar (calculated by the selling exchange rate data from Bank Indonesia).

2.3. Case Selection and Survey Arrangements

To clarify the transition of the modern production schemes, we selected suppliers from the cases examined by the World Bank [25] to cover various organizations after excluding those that had already exited the market. Based on the World Bank [25], as shown in Figure 2, the suppliers can be categorized by their position in the value chain and by the governance of contracted producers following three types:

1. Non-producer type, procured from the farmers' group (Bimandiri, Putri Segar, and Saung Miruan);
2. Producer type, having contracted farmers in his or her cooperatives (Koperasi Pondok Pesantren Al-Ittifaq, hereafter "Alittifaq");
3. Producer type, having individual contracted farmers (Lyco Farm, Bukit Organic, Deding and Hikmah; note that we omit Amazing Farm from the listing due to a lack of information for the categorization).

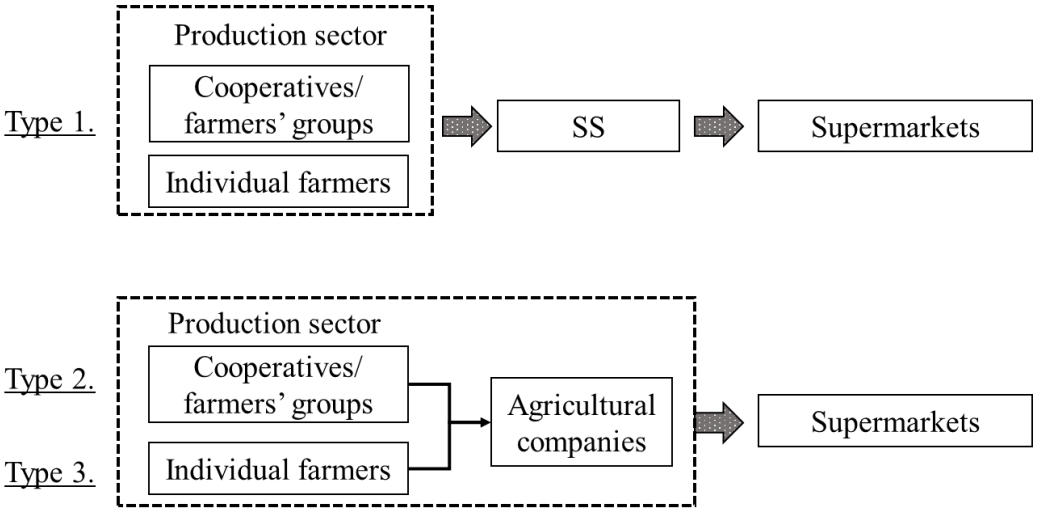

Figure 2. Main channels of rural suppliers for supermarkets in West Java described in detail by the World Bank [25].

While type 1 organization is of SS, we refer to types 2 and 3 as *agricultural companies*. We selected Bimandiri from type 1, Alittifaq from type 2, and Lyco Farm from type 3 to cover all types of organizations. Before conducting the field interviews, some companies exited the market: Putri Segar and Saung Miruan and Bukit Organic. Thus, type 1 companies might face difficulty in sustaining their business. Accordingly, we conducted in-depth interviews with Bimandiri and the supplier to double check the conditions of their contract. Lyco Farm seems to be a contractive case to Alittifaq in agricultural companies because they show opposite trends of business performance. Although the number of cases is limited, this survey strategy seems reasonable to examine our object.

The field survey was conducted through face-to-face interviews in September 2019. Each firm representative was located around Lembang subdistrict, Bandung district, West Java Province, and was asked the following three points:

1. Contents of contracts including types of investments for contracted farmers and settlement measures;
2. The extent of opportunistic behavior in transactions;
3. The coping strategy if the farmer breaches contracts.

Subsequently, detailed information on changes in contract farming after 2006, according to interviews conducted by the World Bank [25], was gathered. According to the aforementioned hypothesis, we focused on the following points from the obtained interview data:

1. Effects of changes in traditional markets' prices on buyer-side efforts to sustain contracts for testing the first hypothesis;
2. The existence of social sanctions for farmers who breach contracts for testing the second hypothesis;
3. The kinds of investments conducted by buyers for testing the third hypothesis.

2.4. Transitions of SS and Agricultural Companies from the Cases

We illustrate survey results for current SS and agricultural companies with reference to those of 2006 in the World Bank [25] and especially explore determinants of sustaining contract farming. The marketing channels in 2019 are illustrated in Figure 3.

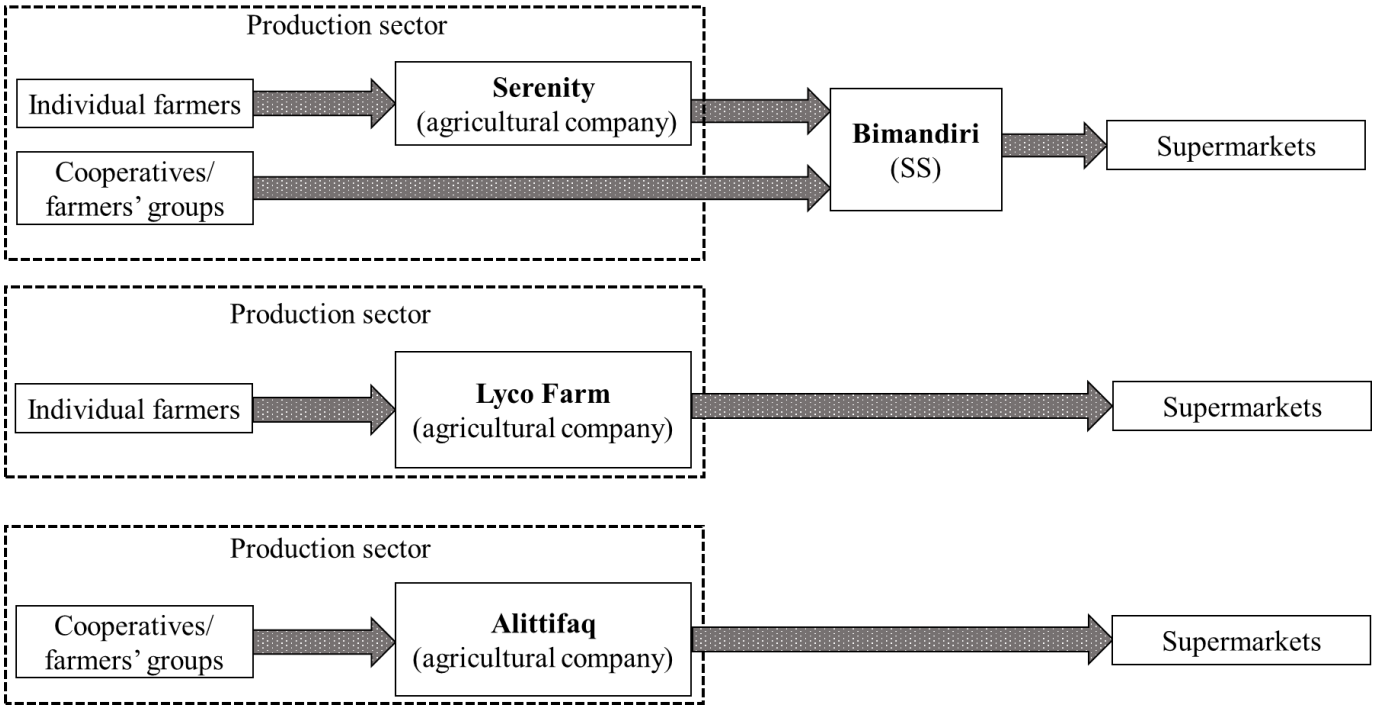

Figure 3. Current marketing channels of rural suppliers for supermarkets from authors' survey.

Bimandiri is a significant case of a SS in Indonesia (see Slamet et al. [29] and Reardon et al. [20]). Since 1994, Bimandiri has transformed from a wholesaler in traditional markets to a SS for supermarkets. Bimandiri attempted direct contracts with growers but struggled to train producers, so the constant trading in qualified vegetables for supermarkets became difficult. Furthermore, the decline in the contracted price with supermarkets due to intense competition by imported low-quality vegetables in 2003 also led to a deteriorated state in the business condition of Bimandiri [25]. While Bimandiri maintained business with approximately 60 suppliers (the majority were agricultural companies and farmers' groups) as of 2019, it decided to cease contract farming in 2010. While Bimandiri has stopped contract farming, which contains investments of inputs and technical assistance for growers, its current procurement scheme is categorized into the marketing contract.

As of 2019, there were no agreements for breaching the marketing contract between Bimandiri and the farmers' group. The contract involved written agreements only about weekly prices. At the same time, both parties made verbal promises to trade specific commodities. The quantity of each tradable vegetable had been speculated and proposed by Bimandiri and could be changed along with the prices of traditional markets. Since farmers have various options to sell their vegetables to other SS or traditional markets with competitive prices, farmers cannot accept any punishment on the contract. Such opportunities induced growers' hold-up problems and abandoned the contract farming introduced, although farmers currently do not show opportunistic behavior (interview with a manager of Bimandiri on 27 August 2019). In other words, Bimandiri reduced its negotiation power over transactions. This is also supported by findings that Bimandiri made the transaction rules less restrictive than before. For instance, Bimandiri adopted a rapid reimbursement system with CROWDE, an emerging financial company, although payments were previously made to farmers five days after delivery. In addition, farmers could obtain higher prices through renegotiation when traditional markets' prices soar upward.

One of the suppliers for Bimandiri had been Serenity Farm since 2012, which is categorized as an agricultural company. Serenity Farm focused on the trade of green beans and obtained most of the values by sorting and grading green beans (specifically, 20 workers, which was half of the employees, engaged in sorting and grading; 6 workers engaged in agricultural production; 2 workers provided technical assistance to growers in their

plots; and the remaining 2 were office workers.). Serenity sold its green beans to Bimandiri, export companies and wholesalers in traditional markets; out of total sales, 60 percent was attributed to Bimandiri, 30 percent to exports, and 10 percent to traditional wholesalers.

With respect to the procurement of Serenity, this company had utilized contract farming with 30 farmers since 2014. Under the contract, Serenity provided seeds of green beans and technical advice to farmers for exclusive deals. The price in the contract was usually decided before the beans were planted. Although the penalty terms were not included in the contract, Serenity could stop providing the seeds and technical advice to farmers who breached the contract. This option prevents farmers from aspiring to side-sell, although the farmers' incentive seems to be low due to the stable price of green beans in traditional markets. In addition, Serenity preferred to trade with farmers with a good reputation in the rural community, i.e., higher costs associated with the loss of reputation to prevent breaching the contract. This behavior also represses the side-selling of farmers.

Lyco Farm started trading with supermarkets (Yogya) in 2003 and introduced a unique and sophisticated farming practice around Indonesia. For example, from 2006, Lyco Farm targeted the production of specific tomatoes through growth with few agrochemicals to obtain price premiums from the participation of modern channels [25]. Therefore, Lyco Farm supported smallholder farmers through investments mainly for external inputs [34], promoted the maintenance of irrigation, provided seeds and fertilizer to farmers, rented farming areas to farmers, and provided technical advice (see details reported by the World Bank [25]).

However, the contract farming of Lyco Farm failed in 2008. Then, from the aspects of the procurements of Lyco Farm, a marketing contract was applied: it sets the contract price depending on prices in the traditional markets as Bimandiri did. It usually proposed higher prices since some contracted farmers sold their products to traditional markets instead of supplying them to Lyco Farm. This side-selling behavior hampered the stable procurement and business growth for Lyco Farm. Specifically, Lyco Farm decided to set the minimum contract price at 3500 Rp per kg; when the wholesale price in traditional markets increased, Lyco Farm procured tomatoes at 2000 Rp per kg higher than traditional markets. Although price setting seems to be valuable for contracted farmers, Lyco Farm faced the loss of contracted farmers from seven in 2006 to five in 2019. In addition, the farming area also decreased from 5 ha in 2006 to 2 ha in 2019. This suggests that the efforts of Lyco farms were not sufficient to prevent side-selling by farmers, which was caused by the competitive prices in traditional wholesale markets, as described before.

Alittifaq applied a form of agricultural cooperation and started trading with various supermarkets in 1993. As of 2019, unlike in the case of Lyco Farm, the business size expanded, and contract farming was sustained. While Alittifaq procured vegetables from farmers' groups, the relationship between them is unique. Alittifaq features an Islamic boarding school for farmers. Under such a relationship, Alittifaq enhanced its business scales. Specifically, Alittifaq arranged contract farming with five farmers' groups and had 326 farmers in 2006; then, as of 2019, Alittifaq expanded contract farming with nine farmers' groups (approximately 270 farmers) in which farmers received training from Alittifaq as students. In addition, Alittifaq procures vegetables from another 20 farmers' groups (approximately 500 farmers).

Nevertheless, the agreements in the contract had been changed. Alittifaq stopped providing fertilizer and seeds to farmers, as reported by the World Bank. In the contract, both parties agreed on the types of vegetables, the amount of each vegetable, and the timing of settlements (every Friday). Although this type of contract farming seems to be a marketing contract, Alittifaq provides technical assistance to the students to produce upgraded vegetables. Therefore, Alittifaq utilizes contract farming by concentrating on investing in training costs rather than external input costs. The latter investment was emphasized in the case of Lyco Farm.

3. Results

We can classify the above cases of agricultural firms as follows: Serenity and Alittifaq can sustain contract farming; Lyco Farm stops contract farming and adopts a marketing contract. Here, we consider how contract farming with farmers could be sustained from the perspectives of the three theoretical hypotheses described above. We test the three hypotheses by comparing the cases of agricultural companies and the results are summarized in Table 1.

Table 1. Summary of data for testing hypotheses.

No. of Hypotheses	Corresponding Test Points	Serenity	Lyco Farm	Alittifaq
1	Competitiveness of contracted price compared to prices in traditional markets	None available, but the contracted price is stable	Competitive	None available, but the contracted price is stable
2	The existence of penalties in contracts.	No	No	No
2	The extent to which the social sanction enforces contract farming	High	Low	None available
3	Type of investments	Investments in inputs and training.	Nothing	Investment in training
	Kept contract farming since 2006?	Not applicable	No	Yes
	Type of contracts in 2019	Production contract	Marketing contract	Production contract

For the first hypothesis, we expected agricultural firms to pay price premiums compared to prices in traditional markets. As we expected, Lyco Firm provided higher prices and opportunities to adjust the prices depending on the price fluctuation in traditional markets; however, Lyco Firm failed to sustain contract farming. Thus, the first hypothesis cannot be accepted to support contract farming. Although we could not obtain direct evidence to test this hypothesis for both Serenity and Alittifaq, they offer stable prices to contracted farmers; in the case of Serenity, prices of green beans are relatively stable in the traditional market; Alittifaq signs a lump sum contract with each supermarket and can control their bids. Therefore, stable price offers may be profitable for contracted farmers and they support contract farming, as suggested by [37].

Next, from the second hypothesis, we expected the existence of some penalties in the contractual agreement. However, no agricultural companies adopted them in their contracts. Meanwhile, we also expected that loss of social reputation for farmers who breach the contracts, i.e., social punishment in their community, whereby they incur high costs so that they fulfil the contracts. While Lyco Farm could have used this enforcement mechanism, it was not effective. This may be caused by the scale of business and the relatively small-scale business of Lyco Farm compared with other agricultural companies. Then, according to an interview with a manager of Bimandiri and Serenity, farmers are afraid of such potential damages becauseof possible exclusion from the social networks in which they share information on new production technology and market trends. Therefore, we accept the second hypothesis as the social sanction in Java supporting contract farming.

Finally, we compared the types of investments made by agricultural companies to examine the third hypothesis and expected that investment in training for technical improvement would be more suitable to support contract farming than input provision. Although we could not obtain direct evidence, we clarified that weighting on a specific type of investment is required from the cases we examined, because Bimandiri and Lyco Farm adopted both types of investments but failed to sustain contract farming. Then, Alittifaq shows the significance of investment in training for maintaining contract farming, which is required at the beginning of the transaction but decreases if the trade is repeated. Meanwhile, Serenity reveals that investment in specific input provision could be a key to

sustaining contract farming because Serenity has an option to stop providing seeds of green beans if the contracted farmer carries out side-selling. For the latter investment, there may be an informal penalty in contracts.

4. Discussion

While contract farming schemes might not prevail in Indonesia, this follow-up case study indicates the potential for traditional channels evolving with supermarkets. The movement is partially caused by the entrepreneurship of smallholders, as illustrated by Hayami and Kawagoe [5]. For example, some farmers who left contract farming with Bimandiri transformed themselves into intermediaries who organized farmers' groups and developed technology to produce upgraded vegetables, as Bimandiri had organized for them. Such new intermediaries then trade with SS or similar firms and traditional wholesalers; the highest-graded vegetables are sold to the former and others to the latter. Moreover, such adaptivity of smallholders to market changes such as the supermarket revolution can be observed under the COVID-19 pandemic; farmers' groups that trade with supermarkets move to e-commerce markets organized by Lazada [38]. As Reardon et al. [39] suggested, the transition of smallholders to e-commerce may be a temporary phenomenon; this study supports the possibility of involving the new channel into the traditional channel by smallholders.

For policy implications, and in line with the discussion of Reardon et al. [40], this study suggests that public support, which does not cover traditional marketing, is not sufficient to achieve sustainable agricultural development for smallholder farmers in the long term. Our study clarifies that farmers who have experienced contract farming return to traditional marketing as traders, and arrange farmers' organizations by themselves. Therefore, such a spillover effect from modern marketing to traditional marketing indicates that public support for traditional marketing is still vital for sustainable perspectives.

The main limitation of the study described herein is a lack of transaction data from supermarkets, i.e., on coordination problems between agricultural companies and supermarkets. Although we currently focus on the relationship between agricultural companies and farmers, the failure of contract farming is partly affected by unpaid credit orders by traded supermarkets—the problem regarding long-term settlement. Specifically, in the case of Lyco Farm, trading of a supermarket was denied and stopped in 2011 because the sales for the supermarket remained unpaid, and the supermarket requested advertisement costs and other unclear costs. Although a similar issue was reported for Amazing Firm by the World Bank [25] and the contract terms of Alittifaq with supermarkets are not different from those of Lyco Farm, Alittifaq did not in fact face a similar issue. Investigation of such a coordination problem is a potential direction for future work, although it depends on the availability of transaction data from supermarkets.

5. Conclusions

This paper investigates whether modern agricultural practices/technologies, i.e., the contract farming scheme, have been sustained among the SS and growers as a follow-up survey of World Bank [25]. The contract farming introduced by SS is hampered by the hold-up problem of producers who are invested in production inputs and conduct side selling in traditional markets. From our analysis, contract farming could be sustained by investments either in technical training or input provision, the high costs of social reputation in the rural community, along with contract theory.

However, such contract farming in Java is a not unsuccessful attempt at agricultural development but a useful attempt to train smallholder farmers to produce high-quality commodities. Contract farming has been changed to marketing contracts along with the transitions of traditional markets. Interestingly, the consequences of traditional markets were reassessed for farmers who engaged in contract farming introduced by the SS. The farmers not only became intermediaries in traditional markets, they also arranged farmers' groups to produce high-quality vegetables. In other words, the insightful cases

show the possibility of sustaining contract farming and providing valuable experiences for smallholder farmers, who are also leaders in managing farmers' groups. Although the applicability of the same scheme in other areas is under consideration, the dynamic mechanism of traditional marketing should be considered in public marketing policy in Indonesia.

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