

VERTICAL COORDINATION IN INDONESIAN DAIRY INDUSTRY: A COMPARISON OF PERFORMANCE ON MILK QUALITY OF TWO REGIONS

Rahmat Yanuar^{1*} and Paul Hoebink²

¹Department of Agribusiness, Faculty of Economics and Management,
IPB University, Bogor, Indonesia

²Radboud University Nijmegen and Rhein-Waal University in Kleve, The Netherlands

*Corresponding author: r_yanuar@apps.ipb.ac.id

(Received: March 20, 2023; Accepted: November 22, 2023)

ABSTRACT

The alterations in the institutional environment within the Indonesian dairy sector have had an impacted the industry's strategies regarding their partnership with dairy cooperatives and farmers. A previous study found that rising consumer milk quality standards drive vertical coordination, in which the industry is more closely aligned with producers (farmers). The study attempts to answer why some regions have better milk quality than others. This study compares two regions in Indonesia which have a different performance in producing milk quality. This study's research methodology consisted of in-depth interviews with 29 key informants in the period of 2013 and updated in 2018, supplemented by secondary data. Two regions, namely East Java and West Java, were chosen as the focus of this study. The study demonstrates notable disparities in the implementation of vertical coordination within the milk value chain between the two areas. Vertical coordination is strongly influenced by the power of the lead firm and the regional characteristics in each region. Furthermore, vertical coordination positively improves the quality of fresh milk in both regions, with East Java having the best milk quality. Improving the performance and sustainability of the dairy value chain requires consideration of institutional arrangements, particularly those related to contract transparency.

Key words: institutional environment, institutional arrangement, partnership, total plate count

INTRODUCTION

Dairy is the biggest revenue producer and fastest growing category in the food and beverage industry, not only in the high-consuming mature markets, but also in emerging markets, in Asia particularly. Indonesia is such a market, where dairy production and consumption grow faster than GDP. The Indonesian dairy sector had been highly regulated, especially in the period of 1980-1997, in contrast with trade and investment policy reforms elsewhere in the economy. The regulations, aimed mainly at fostering the development of the local industry, included an import ratio requirement, import tariffs, an import licensing scheme, and restrictions on investment in milk processing (Erwidodo and Trewin 1996). These policies have resulted in a significant increase in the number of dairy farmers and dairy cattle, in fresh milk production and in other end products, but they imposed substantial costs on consumers and the economy (Erwidodo and Trewin 1996; Riethmuller et al. 1999). However, since the 1997/1999 economic crisis, the Government of Indonesia released a policy reform loosening the regulations under the pressure of the IMF.

The policy reforms brought market liberalization and had an impact on all the stakeholders involved in the dairy industry. With the relaxation of import controls and the removal of the obligation for processors to purchase domestically produced milk, the pressure is obviously high for the Indonesian dairy industry to dramatically improve its productivity level (Beghin 2006). The strong intervention of government in the past created a high dependence of farmers and cooperatives on the industry, and it makes them not always ready to face the dynamic market. The outcome was that many dairy farmers faced serious constraints in accessing essential inputs and in selling their products.

The policy reforms also affected the ability of dairy producers (mostly smallholders) to meet the high-quality standards. There are differences in (private and public) food quality standards. The consumer trend is to be more demanding on specific quality attributes and consumers are much more aware about food safety issues (Dries and Swinnen 2004; Swinnen 2007). This drives the industries to procure the dairy products with a high-quality standard, but farmers are having difficulty in fulfilling the required milk standard. As a result, there is felt need for vertical coordination in the value chain (Bijman et al. 2011).

In a situation where the government's role in supporting dairy development is decreased, the private industries began contracting farms and rural households to provide basic inputs in return for guaranteed and quality supplies. The World Bank indicates that in the absence of appropriate public institutions, private contractual initiatives, particularly from large food and agribusiness companies, are emerging to overcome the obstacles (Van Berkum 2007). This is also supported by Swinnen and Maertens (2007) who argued that liberalization caused disruption of government control in agricultural institutions and is followed by the emergence of new forms of vertical coordination. New forms of vertical coordination are no longer state-controlled but are introduced by private companies which they called private vertical coordination (Swinnen and Maertens 2007).

This study examines the case of the Indonesian dairy industry and shows how the institutional arrangements influence the performance of the industry. In this study, an institutional arrangement is defined as a set of rules or agreements governing the activities of a specific group of people pursuing an objective. The institutional arrangement is also termed as "governance structure" and can be thought of as vertical coordination which is varying between the two extremes of spot market exchanges (0) and full ownership integration (1). Vertical coordination refers to the coordination and integration of different stages in a supply chain, specifically from raw material production to final product distribution. Several studies have examined vertical coordination in the context of the dairy industry (Dries and Swinnen 2004; Dries et al 2009; Szabó and Popovics 2009; Falkowsky 2012; Saenger et al 2013; Kilelu et al 2017a; Kilelu et al 2017b; Zhong et al 2018; Hayer et al 2019; Ekumankama et al. 2020). One study by Dries et al (2009) analyzed the use of contracts in European transition economies to facilitate vertical coordination in agri-food supply chains, with a focus on the dairy industry. This study found that contracts were increasingly being used in the dairy industry to enhance coordination between producers, processors, and other actors in the supply chain. In a separate study, Dries and Swinnen (2004) examined how foreign investment affected the enforcement of contracts to promote suppliers (farmers) to meet the necessary standards and facilitate vertical coordination. The processor offers assistance programs aimed at enhancing access to technology, credit, and other inputs, as well as improving supplier management. The contracts and assistance programs are strategically coordinated to surmount imperfections within the market.

Previous research examined the implementation of vertical coordination by conducting comparative analyses across multiple countries and assessing its effects on various sectors within each country (Dries et al. 2009). In the meantime, a number of additional studies examined the execution of vertical coordination within a single country, with a specific emphasis on a particular sector, such as dairy. These studies evaluated the effects of such coordination on the performance of this sector (Kilelu

et al. 2017a; Kilelu et al. 2017b; Hayer et al. 2019). Numerous prior studies conducted performance evaluations among cases within the same sector that employ vertical coordination strategies (Zhong et al. 2018). Several scholarly studies examined the implementation of vertical coordination in the supply chain, specifically focusing on the performance of suppliers (farmers) (Dries and Swinnen, 2004; Falkowsky, 2012; Saenger et al. 2013). However, further investigation is still necessary to completely understand the specific mechanisms and outcomes of vertical coordination in the dairy industry, especially when contrasting the two areas. The study looked at the dairy industry performance only from the angle of milk quality which is produced by farmers or cooperatives. The study attempted to answer why some regions have better milk quality than others. This study compared two regions in Indonesia which have a different performance in producing milk quality. Are the differences in quality between the two regions influenced by differences in institutional arrangements? Two regions were selected in Java, East Java and West Java, where East Java has better quality of milk compared to West Java. At the national level, the achievement of national milk quality standards (SNI) reached only 12 percent on average, while the achievement of SNI in East Java reached 75 percent (Morey 2011).

The milk quality differences between these two regions are interesting to study: it can be an entry point to examine dairy development from a regional perspective, and also from a perspective of different institutional arrangements. The differences in performance of the dairy industry between West Java and East Java can be influenced by the institutional settings, which might have an impact on the way actors are implementing their plans in the industry. It leads to the following sub-questions:

1. How is the improvement of milk quality organized in East and West Java?
2. How does partnership between lead firms and other actors in the value chain in each region affect the improvement in milk quality?

Overview of the dairy industry in Indonesia. In the last ten years, Indonesia's dairy industry and dairy products have experienced a high increase in demand with a rise of over 10% on an annual basis. The increase is due to the changing consumer habits and population growth, and the increase of incomes (Beghin 2006; Morey 2011). Traditionally, dairy consumption, especially of fresh milk is not part of the Asian diet, particularly not in Indonesia (Dong 2005). Dairy products mostly are consumed as powdered milk and as sweet condensed milk. In 2020 per capita domestic milk consumption is still considered low (16.27 kg/capita/year) which is significantly less than other Southeast Asian Countries, e.g., the 36.20 kg/capita/year in the Malaysia, Myanmar (26.7 kg/capita/year and the 22.2 kg/capita/year in Thailand (Daryanto et al 2021). However, Tetra Pak (2014) reported that milk consumption in Indonesia has the highest growth rate in ASEAN countries at 4.8% per year over the period 2006-2010.

About 77% of the Indonesia's current milk demand is fulfilled by imported milk and milk products, amounting to US\$ 1.1 billion per year, while the rest comes from domestic supplies. Indonesia meets its domestic consumption through annual imports amounting to 3.37million Metric Ton (MT) of (whole and skimmed) milk powder and condensed milk, mainly from Australia and New Zealand, and also from the EU and the US, which is equivalent to 77% of the total domestic consumption. The country's demand for milk in 2021 stood at 4.31 million MT with local producers supplying approximately 935,000 MT (USDA FAS 2021).

The domestic milk is supplied by approximately 100,000 small farmers who are members of their local dairy cooperative. Based on data from Statistics Indonesia (2021), the small farmers hold approximately 557,000 dairy cattle, producing 935,000 MT which are mainly concentrated in West, Central and East Java (97% in Java and with a small proportion of around 3% in Sumatra and Sulawesi). Farmers typically have 3-4 cows, while only 1% of the farmers have a herd size between 50 and 100 cows. The average daily milk production is 11.5 L/head with an average lactation period of 271 days thus, the average production is about 3,139 L per lactation. This last figure has increased on an annual

basis over the past 5 years for members of dairy cooperatives at 42% (in total), however the average is brought down by individual producers where productivity has grown by only 19% (Morey 2011; Moran and Morey 2015).

The dairy processing industries (DPIs) in Indonesia comprise of major local companies (e.g., Indolakto and Ultra Jaya) and multinational companies (e.g., Frisian Flag, and Nestlé). Recently, several multinational companies like Fonterra (New Zealand), Arla (Denmark), Mitsui (Japan) and Greenfield (Australia) entered the market. There are about 40 DPIs in Indonesia, in which six large firms account for 85 percent of domestic milk processing. West Java has the six largest DPIs from the more than 30 DPIs located in this region (Morey 2011). This large number of DPIs shows that the dairy market situation in this region is more crowded compared to other regions. Frisian Flag is located in this region and is key international player who produces 280 MET of liquid and condensed milk per year. Danone Dairy (until 2014 when it sold its dairy business to Indofood), which produces infant nutrition, and Unilever which produces frozen dairy products such as ice cream, were also located in this region. In addition, West Java also has local players such as Indolakto, which is part of the conglomerate Indofood CBP Sukses Makmur, and is one of the largest dairy brands in Indonesia with a market dominance in UHT and sterilized milk. The other key local player is Ultra Jaya, which has joint venture 3,000 cows of dairy farm in Bandung. Many DPIs established their plants in this region because of the proximity of consumers. West Java is one of the regions with the largest population in Indonesia with Jakarta, the capital city.

In East Java, Nestlé is the key international player in the industry in the liquid and powdered dairy product sector and it produces 116,000 MET of milk per year. Another DPI in East Java is Indolakto, which has also been operating in this region for many years. The company focuses on milk processing by using powdered milk as well as raw material. This explains why it does not require so much fresh milk compared to Nestlé. In 2012, Indolakto has also established a new milk processing plant in the district of Pasuruan, with a capacity of 1,000 tons per day.

Analytical framework. The theoretical framework designed to address the key research questions of this study draws on value chain analysis, local-regional theories, and concepts and concentrates itself on a regional level. It is composed of two main elements: first, value chain factors and second, regional characteristics. In this analysis, we emphasize those value chain factors related to governance that many scholars also relate to governance and coordination (Williamson 1985; Altenburg 2006). In this framework, we tried to connect the value chain analysis with new institutional economics analysis while mapping the regional development analysis with macro and micro levels.

It is important to note that Institutional Economics especially the New Institutional Economics (NIE) operates at two levels, macro and micro. The macro levels deal with the institutional environment, or the rules of the game, which affect the behavior and performance of economic actors and in which organizational forms and transactions are embedded. Williamson (1985) describes it as the set of fundamental political, social, and legal ground rules that establish the basis for production, exchange, and distribution. Rules governing elections, property rights, and the rights of contracts are examples of ground rules that make up the economic environment.

The micro level analysis, on the other hand, also known as “institutional arrangements”, addresses arrangements between economic units that govern the ways in which these units can cooperate or compete. We can define the institutional arrangements as a governance structure which includes vertical coordination as a mechanism within a value chain analysis. Vertical coordination, on the basis of this, refers to how products move through the supply chain from production to consumption (Hobbs and Young, 2000). Vertical coordination, in its broadest sense, describes the synchronization of the various steps in the vertical marketing channel from producers to consumers in order to address

supply and quality issues (Götz et al. 2009). Spot markets are not encompassed within this framework, as they solely rely on price agreements for the exchange of commodities. The concept encompasses both Production partnerships and vertical integration (Swinnen and Maertens 2007). There exists an accepted view that placing a higher priority on the quality and/or quantity of raw materials results in a more significant shift from spot market transactions to more sophisticated vertical coordination mechanisms. Vertical coordination is viewed as a continuum, implying that the more interdependent the activities of the seller and buyer, the more coordination is required (Zhong et al. 2018). A productive partnership can be characterized as a form of vertical coordination strategy that involves collaboration between independent firms. In this specific mode of collaboration, the participating firms engage in a reciprocal sharing of common interests, as well as knowledge and resources, with the aim of enhancing the overall efficiency of the value chain (Götz et al. 2009). We assume that the institutional environment affects the actors in the value chain also to choose specific governance structures. The institutional environment can create differences between regions and it might bring differences in the setting of institutional arrangements in a specific region. This could explain theoretically why actors choose different governance structures or different institutional arrangements. For example, many scholars agree that vertical coordination or hybrid forms of governance that are closely related to vertical integration are most suitable for improving the socio-economic performance of producers, thus reducing the gaps between the local market and the export market and enhancing the overall performance of the supply chain (Arias 2007).

Figure 1 explains how changes in the institutional environment in any period can be followed by a change in institutional arrangements. In the case of the Indonesian dairy industry the changes in the institutional environment occurred through the changes in government policy which previously very strongly regulated the sector and now liberalized it. It means that the industries had no control anymore on their imports, no obligation to purchase locally produced milk and that it was easier for foreign investment to come to Indonesia. These changes were responded by the units/actors in the dairy industry with changes in their institutional arrangements. However, those changes in the institutional arrangements may differ between regions which of course will result in differences in outcomes across the regions.

Theoretically the reason for an actor or unit to choose or change their institutional arrangements is motivated by the need to reduce or minimize the transaction costs. For instance, selecting cooperatives can be an alternative for governance to reduce transaction costs. As stated by Iliopoulos and Cook (1999, 78) cooperatives “represent a hybrid organizational mode blending market forces with elements of internal organization designed to minimize transaction costs”. In addition, the contractual arrangement can also be an alternative for reducing transaction costs. The alternative institutional arrangements have developed to minimize the transaction costs of ownership and contractual arrangements (Eaton et al. 2008).

Dairy products have a specific characteristic of being perishable and having a high asset specificity which potentially affects the *holdup* problem in the transactions. Many of the benefits farmers receive from establishing cooperatives originate from the holdup problem and the opportunistic behavior associated with asset fixity (Staadz 1994). Royer (1999) gave an example related to these problems. In order to force the farmers to accept lower prices, the processor can refuse to accept the delivered commodity. On the contrary, the processor can also potentially be threatened by farmers who hold up to supply their product (in case there are no other suppliers), when the processor has invested in a specific (idiosyncratic) plant. A strategy for producers to eliminate or minimize the holdup problem is for them to purchase the processing plant (i.e., to vertically integrate their operations) this could provide them with the necessary market power and guaranteed market access.

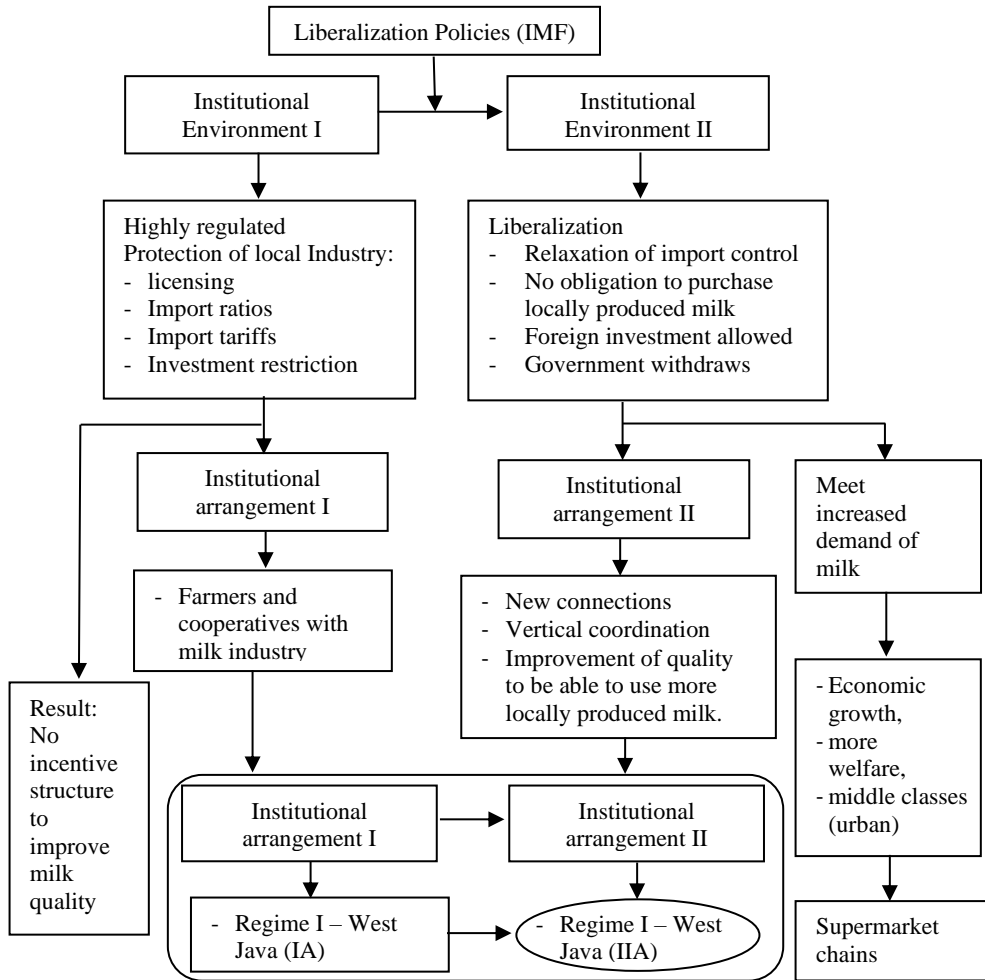


Fig. 1. Analytical framework: The institutional changes in Indonesian dairy industry

RESEARCH METHODS

The research strategy for this study is based on a comparative case study of the value chains of milk production in two different regions, East Java and West Java. The data and information for this article are gathered in two periods: the first condition at 2013 and then updated by the condition of 2018. These two regions were chosen because they are the major producers of milk in Indonesia. East Java province contributed 54.2 percent of total national milk production, with West Java contributing 33 percent. Furthermore, the two regions perform differently in terms of the quality of milk produced (Morey 2011).

The methodological design considers the guidelines set by Yin (2004). A case study is an empirical inquiry that researches a contemporary phenomenon within a real-life context, especially when the limits between the phenomenon and the context are not evident. It benefits from a previous development of theoretical propositions to guide the collection and analysis of data. The construction of the cases integrates the following elements: the regional characteristics, the institutional environment,

the regional setting of the dairy value chain including institutional arrangements, a description of the value chain in both provinces. The purpose of the comparison is to find out what are the effects of the different regional characteristics and governance configurations of the chain, on a meso-level of intervention, at the regional level.

The research relies on a combination of secondary and primary sources. The secondary sources come from documents from the Ministry of Agriculture, the Union of Indonesian Dairy Cooperatives (UIDC/GKSI), NGOs, universities, and private firms. The primary sources come mostly from key stakeholders (chain operators), government officials at national and district level and experts of the Value Chains (VCs). In-depth interviews using semi-structured questionnaires with key informants of the VCs in different regions where the research took place were also conducted. A total of 29 key informants were interviewed: 16 cooperative's leaders, 3 dairy experts/consultants, 4 government officials and 2 milk collectors. Four cooperatives were selected from Bandung and West Bandung regencies in West Java and four cooperatives from Malang and Pasuruan regencies in East Java. The selection of cooperatives was based on member size and milk production. Both in West Java and East Java, two cooperatives were selected that represent the larger sized cooperatives (between 4,000 and 10,000 members) and two cooperatives that reflect the smaller/medium sized cooperatives (between 100 and 2,000 members). Three dairy processing industries (DPI) in each region were also selected based on the share of milk sales that have been sold by the cooperatives to these industries.

RESULTS AND DISCUSSION

The organization of improving milk quality in West and East Java:

Milk collection. Milking was usually carried out twice a day at 04:00 – 06:00 AM and 02:00-04:00 PM. The milk was collected into milk churns with a capacity of 15 or 25 liters depending upon the production or numbers of lactating cows. The milk was taken to the nearest Milk Collection Center (MCC), usually owned by cooperatives, on foot, by bicycle, or by motorbike. At this point, the milk was transferred into 50-liter churns or in a milk tank, and the quality was screened using an alcohol test and a lactometer by the technical staff of the dairy cooperative. In some cooperatives, mostly in East Java, the staff of cooperatives also took a sample of the milk to test the composition of milk and the bacteria content (total plate count/TPC). This testing was performed in the presence of the farmers' representative, and both parties countersigned for milk quantity and quality.

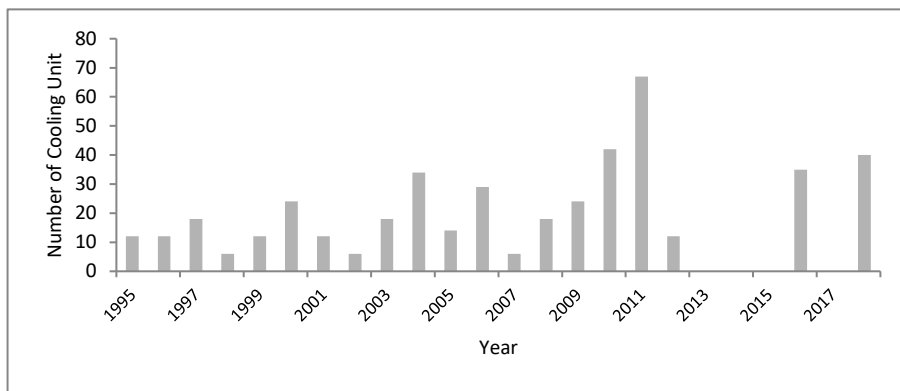
In most of the areas, MCCs were usually the bulking centres for the dairy cooperatives. In every village, there was at least one MMC to which small-scale individual farms from the village deliver their raw (fresh) milk. In small villages, there was often only one MCC, while in medium and large villages, there could be two or more. MCCs were mostly established by cooperatives or by individuals (collectors) who then delivered to the processors¹.

An MCC is managed by cooperatives or in some rare cases, by a collector located in the village. The cooperative arrangements between cooperatives and dairy processors were determined by a written contract (especially in East Java), but verbal agreements between both parties also existed. Cooperatives or milk collectors were responsible for the interactions with farmers, in collecting raw milk in its storages until the milk truck arrived to collect and for taking samples of the delivered milk for quality tests. For their services, cooperatives received a percentage (fee) of the total turnover. The

¹ Side-sales or 'hawking' to the middlemen who buy milk from the farmers and sell the milk to the industry. The collectors become an alternative market for the farmers when cooperatives cannot offer the services as expected by the farmers. Some cooperatives can be inefficient in term of high overhead cost and selling to or being members of the cooperatives might then be less advantage compared to selling to the collectors.

fee varied and depended on the condition of the cooperatives. The MCC's role as an intermediary significantly reduced the transaction costs of the processors. To calculate this fee, an example might be that one of the few large dairy farms receives Rp 6,000 (equal to US\$ 0.39) for high quality milk, while a cooperative member in the same region receives Rp 4,700 (equal to US\$ 0.31) for the same quality.

In East Java, a major milk processor (Nestlé) has been providing milk cooling units (with a capacity of 2.5 tons each) to MCCs owned by cooperatives. In the period 1995 to 2018, Nestlé supported the cooperatives to install in total 441 cooling units (Fig. 2). In addition, the company provided cooling units intensively in the periods 2003 to 2011 which was in line with the quality improvement programs Nestlé developed. In implementing this program, Nestlé signed contracts with the cooperatives, requiring both parties to implement a "standard operating procedure" (SOP) in handling and managing fresh milk from the farmers. The SOP, for example, points out that MCC's staff must send the milk at the MCC to the processor when it has cooled down to four degrees.



Source : Nestlé, 2013 and update it in 2018

Fig. 2. Cooling units installed in MCCs by Nestlé in East Java²

There are 22 dairy cooperatives in West Java, of which 80 percent have cooling units at cooperatives level. Mostly the cooperatives worked with the milk processor to install a cooling unit. Most of the MCCs however, did not have cooling units; only about 20 percent have a cooling unit (GKSI 2012). For example, KPSBU Lembang, the biggest dairy cooperative in West Java, only has five cooling units in 100 MCCs which supply milk to the cooperative. The cooperative used milk trucks to collect milk from the farmers which were not equipped with a cooler. The trucks sent the milk to the cooperative, and then it was cooled down to below 8-degree Celsius before it was carried to the dairy processing plant. If the milk delivered had a temperature of more than eight degrees, the company will give a penalty of Rp. 50 per liter (equal to US\$ 0.003).

Some cooperatives in West Java received a grant from the central government to buy a cooling unit. The grant is allocated by the local government to some cooperatives in this region. However, the grant is not enough to buy a cooling unit because it is rather small. The regional government installed cooling units only in three MCCs in 2010, and four units in 2011. The limited amount of the grant might be a symbol for the limited attention to the dairy sector by the local government. Frisian Flag from 2004

² In 2013-2015 and 2017 there were no cooling units being installed by Nestlé due to a lot of government assistance in installing the cooling in some MCCs in dairy cooperatives

onwards also started providing cooling units, financed partly by the aid envelope of the Government of the Netherlands.

Support for dairy farms in milk quality improvement

West Java³. There are several programs initiated by the dairy processing industries (DPI) to support the farmers and cooperatives. The supporting programs were mostly conducted through partnerships with cooperatives. In their programs, the DPI did not directly support farmers individually, out of the consideration of cost efficiency (high transactions cost). However, not all cooperatives can be a good partner due to the differences in both visions, the organisation's objectives, and their organisational structure. This made the DPIs more selective in selecting their partners and apply certain requirements to obtain the technical assistance (TA) and financial assistance (FA) from them.

In its partnership programs, Frisian Flag Indonesia (FFI) provided loans (with small or no interest rate), grants, and assistance to the cooperatives for the procurement of equipment required to maintain the quality of dairy production and productivity as well. As a part of its social commitment, FFI presently assisted eight dairy cooperatives in West Java. In its approach, FFI preferred to cooperate with dairy cooperatives that share a similar vision as the company, thus the cooperatives would strive to improve dairy farm productivity and milk quality by learning together with FFI. Therefore, FFI implemented various partnership programs whose goals were to improve the process of milk production and milk procurement undertaken by farmers and cooperatives. The company provided technical assistance such as training cooperatives' extension workers, assistance in setting up a laboratory and handling of milk, laboratory equipment installation, developing systems and procedures, setting up logistic systems and recommending bonus and penalty systems.

Ultra Jaya, the domestic-owned company, previously had partnership programs with the largest dairy cooperative in West Java, namely KPBS (Koperasi Peternak Bandung Selatan). In 1979, the company provided a loan to establish a milk treatment plant (MT) in the cooperatives; a loan which is repaid by deduction of milk payments. The milk treatment became a milestone in developing the dairy industry in West Java since milk spoilage was high at that time and the farmers could not send the milk to the dairy processor daily. Currently, this company has applied a different approach in implementing partnership programs by establishing a modern dairy farm which has an area reaching almost 60 hectares located in Pangalengan, south of Bandung, West Java, which was already a site for dairy farming in colonial times. The dairy farm is a joint venture with KPBS in which the cooperative has a share of 25% of the capital. The farm has 2,600 cows and selected 75 farmer members of the cooperative who learned to practice dairy farming and herd management. Each farmer managed 15 cows and stayed in a house on the farm for 12 months. When this program finished, the farmer was expected to be able to practice good farming practice on their farm. Ultrajaya only supported cooperatives in West Java and it covered only four cooperatives with which it has a long relationship.

Indolakto had also some partnership approaches with cooperatives and farmers. The company supported cooperatives by providing a cooling unit, credit for cattle, and a low price for raw materials for feeding (e.g., wheat pollard). To support the farmers, the company has field officers called "KUD services" with the aim to introduce good dairy farming practices (GDFP). However, the program is still limited in its reach to farmers in West Java. The team's effectiveness is strongly related to the coordination between farmers and the cooperatives since most of farmers are controlled by dairy cooperatives.

³ This and the following section are based on a series of interviews foreign owned and Indonesian owned DPIs and the cooperatives' board in both regions.

East Java. Nestlé applied the principle of social responsibility in cooperating with the dairy farmers through the dairy cooperatives (Nestlé 2013). Nestlé's partnership in East Java, involved 41 cooperatives and farms, 40,000 dairy farmers with around 65,000 to 70,000 cows (Scharer 2014). The partnership programs aimed to ensure long-term absorption of milk capacity in the region. In addition, Nestlé also supported suppliers in establishing/improving their operational set-up; accessing milk collection equipment (e.g., transport and cooling units) and provided training for cooperative employees. Nestlé provided technical and financial assistance in order to improve the milk supply chain (milk collection and procurement activities) and to strengthen farmers' viability (milk quality, feed, fodder, cement, animal health, and biogas). By implementing the program through a written contract, Nestlé forced the dairy cooperatives to provide milk to the MCC at a required standard, to ensure the cleanliness and hygiene quality of the purchased milk. Currently, there have been more than 430 MCCs built in most of the cooperatives in East Java. Most of them are equipped with a cooling unit, electricity generator, and hot water installation, in accordance with the standards required by Nestlé. The company implemented certain programs to support government programs. For example, the company assures certainty of milk procurement as a guarantee for credit repayment to back up the government credit scheme to the farmers.

Nestlé also implemented corporate social responsibility (CSR) programs by building more than 8,000 units of biogas installations. The program is in cooperation with dairy cooperatives, local and foreign NGOs⁴ in which it provided the initial funds. Nestlé provided the soft loans (with no interest) to build the biogas installations in the farmers' houses, supplying the energy (biogas) for cooking and lighting. The farmers got the credit from the company through their cooperatives. The company supplies the credit fund through the cooperatives based on the number of members in this program. The credit has a maturity of one to three years payment of which is deducted directly from the sales of fresh milk to the cooperative. Some cooperatives involved in this program provide special resources, such as expert labour to build the biogas installation. In East Java, more than 75% of Nestlé suppliers are participating in this program.

Greenfield, the other DPI in East Java, has its partnership programs by providing five units of Milk Collection Centres with an installed capacity of 25 tons/day and supporting individual farmers directly, with no relations with dairy cooperatives. The company used the MCC as an instrument for coordination with farmers and between the company and farmers. In each MCC, the company encourages farmers to establish farmers groups. The company also has a team of agri-service officers who regularly visit the farmers. To fulfil the needs of farmers, Greenfield provided some farm inputs like milk cans, drugs, vaccines, cement, and high-quality feed that farmers can purchase and pay by deducting the credit from the fresh milk payments. The company distributed the farm inputs through the MCC. In addition, Greenfield has provided veterinarians to manage animal diseases and to assist farmers. They stand ready 24 hours a day.

Currently, Greenfield facilitates farmers access to credit from banks with two different schemes, namely: (1) a CSR-individual loan of Rp 30 million⁵/partner with a flat interest rate of

⁴ The program is called The Indonesian Domestic Biogas Program (IBDP) or known as BIRU program. The program is implemented by Hivos, working closely with the Indonesian Ministry of Energy and Mineral Resources and SNV Netherlands Development Organization. The first phase (2009-2013) was funded by the Dutch embassy in Indonesia (CCPHI 2012).

⁵ Equal to US\$ 2000

6%/year and a maturity of 36 months, including a grace period of 4 months; (2) a KKPE⁶-individual loan of Rp 30 million/partner, that is due within 48 months, with a grace period of 4 months. It has an effective interest rate of 4-5%/year. Both credit schemes have the same payment mechanism in which repayment is deducted from the payment of fresh milk collected at the MCC. The milk payment from the company comes as a guarantee to the bank because the farmers have stable incomes from milk sales. To mitigate the risks, the company provides mentoring programs for farmers. The mentoring programs end when the credit is paid off.

In collecting fresh milk, Greenfield applied a computerized system in the MCCs, and it required the farmers to implement the MCC procedures (i.e., SOP). The MCC system has a slogan of “honest and transparent” to express that the system is trustworthy. The milk collection systems have a set of objectives which should transform all the partners including the farmers, namely: (1) to reach good milk and milk quality standards set by the DPI; (2) to have a milk collection process that can be seen directly by the farmers which will cause an increase of trust in the MCC’s officers; (3) to pay competitive prices; and (4) to create a modern and efficient MCC.

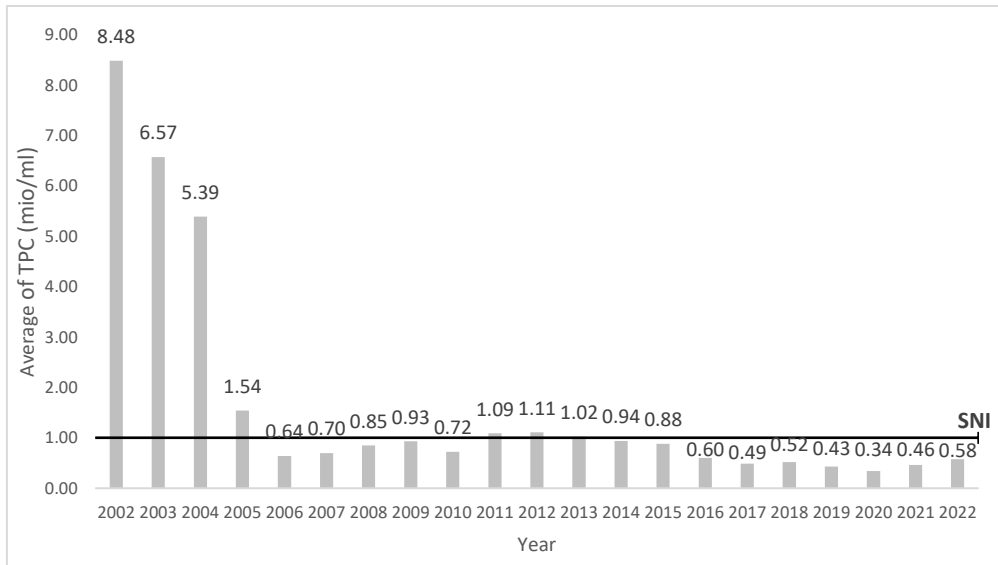
Quality improvement through payment and control system

West Java. DPIs implement milk payment systems (MPS) to improve milk quality. In this system, farmers are required to meet milk quality specifications and are paid incentives or receive penalties accordingly. DPIs paid a higher price for a better quality of milk, and this encouraged farmers to deliver better quality milk to the company. In West Java, the implementation of MPS started in 2001, which was gradually adapted by cooperatives and farmers to meet the milk quality requirements. The milk quality requirements evolved in line with the ability of farmers to fulfil the requirements. Previously, the milk payment was based solely on alcohol and specific gravity tests, and then continued to integrate fat content, fat and total solid (TS) and lastly it considered the amount of protein and bacterial content (TPC/Total Plate Count). However, the implementation of the MPS encountered many obstacles because it is not uniformly applied across the dairy processing industry.

FFI set the price of milk of the farmers or cooperatives based on the quality parameters such as fat content, TS, solid non-fat (SNF), protein and TPC. The milk quality parameters were measured at the collection points by the cooperative and this became the basis for the payment to the farmers. While payments to the cooperative were based on the results of laboratory tests in the FFI plant, FFI used TPC content as a basis for establishing a penalty if it exceeded the standards set. Reducing the number of TPC has become the focus of the FFI partnership programs. FFI supported cooperatives to upgrade the collection process and provided the infrastructure to achieve a high quality of milk. The company provided partnership programs such as to install laboratory equipment, training for laboratory operation and training for extension workers.

FFI also established systems and procedures that are implemented in some cooperatives (about 12 cooperatives that are considered capable and have a shared vision with FFI). Among the 12 cooperatives, KPSBU (Koperasi Peternak Sapi Bandung Utara) is considered the most successful in the implementation of quality improvement systems initiated by FFI. Since the cooperative started the quality improvement program in 2001, the cooperative was able to reach the target and to reduce TPC from above 8 million bacteria per ml in 2002 to close to below 1 million bacteria per ml in 2006 (Fig. 3).

⁶ Food and Energy Security Credit, hereinafter referred to as KKP-E, is investment credit and/or working capital provided to support the implementation of the Food Security Program and Vegetable Fuel Raw Material Plant Development Program.



Sources: KPSBU annual report 2002-2023.

Fig. 3. Milk quality improvements at KPSBU cooperative in West Java (based on Total Plate Count/TPC)

One of the systems initiated by FFI is the formation of “price groups” in the dairy cooperative. These groups had a small number of farmers (5-15 people) which are formed by a cooperative as a basis to take milk sampling tests at the MCC. The milk test result determined the milk price and reduced difficulties if milk quality is tested individually. Each member of the group will receive the same price based on the quality grade. The “price group” is an instrument of social control among the members of the group, and they can support their partners to maintain or improve the milk quality.

FFI obtained support from the Dutch government for the implementation of the program mentioned above. In 2001 for instance, the Dutch government allocated not less than US\$ 0,88 million to support the dairy development program in the country and ten years later it paid 40% of a US\$ 14,3 million project for the development of sustainable dairy villages in East Java. One of the important components of the program is capacity building at the cooperative level where the dairy cooperatives sent 30-40 dairy farmers to be trained intensively as trainers (TOT). From 2003 to 2005 the project continued with a shift in strategy, targeting the institutional building/reformation of the cooperatives (meso-level approach) and had successfully accomplished the objectives of the project. In assisting the dairy cooperatives, FFI followed the cooperative policy of the Indonesian government which assigned to the cooperatives the main role of improving the milk production. Hence, there is no direct intervention at farmer level, but rather advice and recommendations are given to the cooperatives. At present, FFI still continues the dairy development program in collaboration with Indonesian public enterprise and the dairy cooperatives.

PT FFI in collaboration with PT Perkebunan Nusantara VIII (PTPN VIII) and Koperasi Peternak Sapi Bandung (KPSBU) Lembang officially signed a memorandum of understanding (MoU) for the dairy village program as a contribution to the Indonesian government’s plan in reaching national self-sufficiency for fresh milk in November 2013. The partnership program for the period 2013-2017 had a total funding of € 10 million (USD 13 million), of which 4 million Euros (US\$ 5.2 million) came from the Dutch government, and 6 million Euros (US\$ 7.8 million) were given by FFI and cooperatives.

The program aimed to improve the welfare of more than 10 thousand dairy farmers in Pangalengan and Lembang in Bandung district, West Java.

In addition, Ultra Jaya and Indolakto applied a milk payment system like that of the FFI, which used fat, SNF, total solids, protein and TPC as a base parameter for price determination. However, based on interviews with the cooperatives, it was revealed that both Ultra Jaya and Indolakto required lower quality standards than those of FFI, especially for TPC content. FFI set the standard of TPC at a maximum of 1 million per ml of milk, and applied penalties if the milk supplied was above the standard. Indolakto however gave penalties if the TPC content of the milk supplied was above 5 million per ml.

East Java. As the major dairy processing industry in East Java, Nestlé plays an important role in improving milk quality in the region. The partnership programs conducted by Nestlé have a strong influence to set institutional arrangements for quality improvement. By applying a written marketing contract, Nestlé can drive the cooperative and farmers to follow the industry. The agreement is largely aimed at improving milk quality; although it also includes other objectives such as increasing the productivity of dairy cattle. In Nestlé's contract, it is clearly states that each party must fulfill the obligation of improving the quality of milk. The operating instructions of the contract are set in Standard Operating Procedures (SOP), issued by Nestlé. Violation of SOPs implies a reduction of rebates or bonuses received from the milk transactions. The SOPs aim to provide an operational guideline that helps cooperatives fulfill the requirements. In Nestlé's SOPs, the minimum requirements must be applied by a cooperative to be consistent with the fresh milk-marketing contract that has been signed.

In implementing the supporting programs, Nestlé established the MPDD program (Milk Procurement and Dairy Development) which aimed to improve the quality of milk produced and to enhance the operational capabilities of suppliers. Moreover, it attempted to develop trust of Nestlé's suppliers for a long-term sustainable business relationship (Schärer 2014). In this regard, Nestlé set TPC content and TS as a quality parameter on fresh milk on which the payment is based. Some of the steps to take include: (1) the presence of clear standards for fresh milk quality, its handling procedures and requirements for milk storage activities; (2) the "gap assessment" and action plan for the improvement of facilities in order to meet the long-term requirements; (3) the standard fulfillment that is agreed upon and set forth in the fresh milk's sale and purchase contract; (4) the control through MPDD's regular audits; and (5) the agreed upon penalty when the standard is not fulfilled.

Nestlé applied the minimum requirements in the milk marketing contracts. This program started in 2004 by PT Nestlé Indonesia. The minimum requirements that must be implemented by Nestlé's suppliers have some critical points: e.g., at the milk collection point, milk transportation and with the dairy farmers. With the help from MPDD, Nestlé conducted routine audits, controls, and regular milk testing to guarantee food safety. The audit is mandatory for all fresh milk suppliers to ensure that all procedures are in accordance with the standards and conditions set by Nestlé. The audits are divided into two parts, namely a full audit on to the whole operation with each supplier conducted annually, and a partial audit that is conducted monthly. The frequency of the audits can be increased depending on supplier compliance, in line with observation and assessment done by a Field Inspector/MPDD.

At the cooperative level, the minimum requirements are used to ensure that the contract is implemented in accordance with the SOP. The SOP requires that the cooperative provides the MCC with a strict procedure in terms of treating both milk cleaning equipment and hot water facilities. Nestlé also requires trucks for transporting milk to be facilitated CIP (Clean at Place). All equipment must be removed after being used, cleaned and dried.

Nestlé also applies minimum requirements at the farm level. Farmers as members of a cooperative must comply with some procedures, such as a good milking technique in which they must clean the udders before milking and use an antiseptic on the udder after milking. Farmers are also required to clean the milk can and must send milk to MCC using a milk can made from stainless steel or aluminum. The maximum milking intervals are 10-14 hours. If the intervals are too long, it may cause problems with dairy cows and influence the increase in bacterial content. The cooperative used MBRT (Methylene Blue Reductase Test) to monitor the number of bacteria in fresh milk sold by farmers. All the procedures required by the industry serve as a parameter in the audit held by MPDD. If farmers do not comply with the procedures, the cooperative will incur a penalty from the industry.

The marketing contract between Nestlé and the cooperatives also includes a price agreement. In this case, Nestlé applies a price table system based on milk quality. This price table is a combination of the number of bacteria content (TPC) and total solid (TS). The milk pricing based on TPC, divided into 4 grades from a grade 4 (with more than 3 million bacteria/ml) to grade 1 (with less than 1 million bacteria/ml). The total solid in the price table has a range between 11.5 - 12.6 percent. If the TPC reaches grade 1 with a TS above 12%, the cooperative will receive a higher price and this applies vice versa. However, it does not include other incentives, such as competitiveness development incentives,⁷ volume growth incentives and feed bonuses. Nestlé also applied transport incentives calculated based on the destination and the volume of milk. In East Java, the price setting is evaluated every year. The DPI (Nestlé) organized the meeting with primary cooperatives to discuss the development of the dairy industry in the current year and set a target for the next year. In that meeting, Nestlé has the power to deduct price (incentives) for the cooperatives that cannot meet their target.

Institutional arrangements and how they are related with milk quality improvement. The cooperations between DPIs and cooperatives have been implemented for a long time. It started when the cooperatives became an intermediary institution for marketing milk produced by farmers. This was mainly caused by the insistence of the government through a policy of the import ratio/BUSEP to enforce that DPIs should absorb domestic milk⁸. However, previously the relationship was only limited to receiving and paying the appropriate amount of milk volume. The DPIs at that time did not have a commitment to foster and assist the cooperatives, especially in terms of increased productivity and quality. Besides, the farmers or cooperatives were not required to supply milk with a high-quality standard.

Compared with the early period of dairy industry development, the period when the import ratio policy was applied, a change in the market structure occurred. Hosen (2009) argues that the implementation of the import ratio policy changed the fresh milk market structure from buyer market structure to a negotiated market structure leading to a contract system. Consequently, primary dairy cooperatives and GKSI had monopsony and monopoly power in buying and selling fresh milk respectively. The DPIs had to accept the full amount of domestic milk production. Dairy farmers, primary dairy cooperatives and GKSI had the opportunity to set up vertical integration to compete with milk prices in the world market.

⁷ Competitiveness Development Incentive is an incentive which is based on local and international market competitiveness. It paid per kg of fresh milk and composition (TS%). This incentive is not related to quality parameters (TPC grades)

⁸ This is the most complex policy instrument affecting the industry; it is a form of non-tariff barrier in which the government controls the extent of milk imports based on the quantity of domestic milk purchased by milk manufacturers. This mix ratio import was referred to in the decision of three ministers, known as the letter of three ministries which it called SKB = Surat Keputusan Bersama (Remenyi 1986; Erwidodo and Trewin 1996).

In the liberalization era, although DPIs no longer have an obligation to buy milk from cooperatives or farmers, the cooperation between DPIs and cooperatives still exists and is still of importance and even deepened. The DPIs still need a continuous supply of fresh milk from local suppliers to secure their raw material for milk processing, since consumers (city's middle classes) prefer fresh milk⁹ and want high-quality milk. Thus, the liquid milk processing needs fresh milk as a raw material.¹⁰ The changes in the global market also influence the decision of DPIs to stay in cooperation with milk domestic suppliers. As an illustration, in 2008 the world milk market price was increasing and strongly influenced the milk import price. Consequently, the DPIs decided to source more milk from domestic suppliers because it was more competitive than imported milk.¹¹

However, in the absence of an obligation to buy milk only from the cooperatives, DPIs have the freedom to cooperate with other actors in maintaining milk supplies such as with milk collectors. This policy change provides an opportunity for milk collectors to start growing. DPIs in this case use the collectors when it is difficult to negotiate with cooperatives or when they want to grab milk supplies from their competitors especially when fresh milk supply is limited. By providing milk handling equipment and teaching a penetration strategy to the collector, DPIs try to seize milk supplies from their competitors. This phenomenon is explained by one of DPI's managers:

"We buy milk in that region through the milk collector or through the farmer groups. We support the milk collectors. For example, in Y we teach them the strategy to seize the supply of cooperative members X. We provided cooling units and advised the collector to put it in "blank spots" where the distance between the farmers and the cooperatives' milk collection center (MCC) are far enough. I told him (the collector): "Mr... install the cooling unit there and pay 50 rupiah (equal to US\$ 0.003) higher than the cooperative and let them (farmers) move to you" It is proved, from that region, he (the collector) got around 3,000 liters of fresh milk per day". (Dairy Processor 132)

Currently, most of the DPIs do not have contract directly with dairy farmers since the number of cattle they have is very small. Contracting directly with small farmers would certainly involve high transaction costs. As a result, contracts are mostly made between DPIs and cooperatives, although not all the cooperatives are willing to close a contract. Some contracts are written and are evaluated periodically. However, some partnerships are also conducted without any written contract. The reasons why contracts are not written will be explained more in detail in the next section. Additionally, the relationships and how they evolved will be explained by comparing the two regions.

⁹ Tetra Pak Dairy index report (June 2013) shows the rising number of Indonesian consumers on liquid milk especially flavored milk. There is a high growth in the consumption rate of flavored milk. Tetra Pak forecast the growth about 6.7 % annually (between 2012 and 2015), a growth rate higher than forecast in China, India, Malaysia, Thailand and the Philippines. The high growth of liquid milk indicates the increased of fresh milk demand as raw material.

¹⁰ In 2012, three types of consumer products that continue to dominate the market are the liquid ready-to-drink UHT milk, sweetened condensed milk, and powdered milk, with a total market share of 26 percent, 35 percent, and 39 percent respectively. During the past five years, liquid ready-to-drink UHT milk grew the fastest by 17.39 percent annually, while sweetened condensed milk grew negatively

¹¹ The milk price volatility that happened in 2008 made the dairy processing industry concerned to secure their domestic fresh milk supply (Nugraha, 2010). In September 2007, world milk prices (1.25 Butter Fat Skim Milk Powder) increased to US\$ 5,225 per ton, where it was only US\$ 3,100 per ton in January 2007 and about US\$ 3,200 per ton in September 2014.

West Java¹² Milk marketing in West Java is for the major part facilitated by GKSI West Java. Nevertheless, in practice the DPIs can close contracts directly with the primary cooperatives and decide on the amount of milk that will be supplied and on the agreed prices. The role of GKSI is to determine and to negotiate a minimum price based on the milk quality standards. The milk transaction between DPIs and cooperatives is facilitated by GKSI and the payments are directly transferred from the DPIs to the GKSI account before it will be distributed to the cooperatives based on their milk sales. In this way most of the transactions are monitored by GKSI West Java. The amount of milk sales becomes the basis for the board of managers to calculate a fee for financing the operations of GKSI.

In this region, most of the cooperatives are unwilling to go into contracts with DPIs, especially the written contracts. Even though there are no written contracts, the relationship between DPIs and cooperatives is ongoing since they were established 20 years ago. DPIs actually have a desire to close a contract with cooperatives. However, cooperatives often do not want to go into contracts for a longer time because they cannot maneuver then, or they do not have the freedom to sell their milk to another party in case of a difference in prices. It is also due to the differences in the type of contract agreed upon in establishing the relationship. DPIs actually desire to have a contract in particular on a quota not a price contract. Meanwhile, the cooperatives would rather prefer a price contract. This was explained by the cooperative leader and DPI's manager who have been interviewed:

“To be frank, if we are tied by a contract with the DPI, we are afraid that we cannot maneuver when the milk prices received are decreased” (Secondary Dairy Cooperative 211)

“Actually, the industries wanted to make a contract with us, but we have a different opinion on the type of the contract; this cooperative wanted a price-based contract while the industries wanted a quota-based contract. Because of this disagreement we did not find a solution, so the contract was suspended. In addition, there was a fluctuation of the international milk price, so it would be more beneficial for us if there was no contract. Even though de facto the price is decided by the DPI, they also did not want to have independent lab check. They preferred to do it on their own” (Primary Cooperative 221)

“Until now, no one wants to conclude a contract. The idea had been proposed for years, ever since I began working at the company's dairy division. But there was never any cooperative that wanted a contract, because most of the dairy cooperatives have a second buyer. I like to joke with them, asking why their milk supplies are smaller than earlier? And they tell that their milk production was decreased I can only joke "Oh, you move to another heart", I said” (Dairy Processor 132)

Although no written contracts are signed, transactions are still going on on the basis of trust. Although, it is not easy to manage such a relationship, the DPIs and the cooperatives can maintain these for a long term. In some cases the silent or unwritten contract can be violated and then it is difficult to undertake legal action related to violations. One of the DPIs' managers conveyed how a cooperative in West Java violated these relationships.

“We have one of the major suppliers in West Java, namely cooperative X located in Sumedang district. Our supplier has a milk cooling unit and other equipment provided by one of our competitors, the DPI Y. The cooperative X however did not sell their milk to the DPI Y although the DPI Y provided them with milk equipment” (Dairy Processor 132)

¹² This and the following section are based on a series of interviews foreign owned and Indonesian owned DPIs and the cooperatives' board in both regions.

The motivation to violate the agreement may not only come from the cooperatives, but also from the DPIs. The absence of a written contract easily motivates the actors to violate the relationship. It needs good communication and maintaining mutual trust between the DPIs and the cooperatives. For instance, cooperatives expect DPIs to be more understanding and pay attention to the difficulties experienced by farmers at the farm level. Commonly, the cooperatives request the DPIs to increase the milk price in line with the increasing costs of milk production. In this case the price becomes the main signal in the negotiations. As stated by one of the cooperative leaders:

“It is about trust and good communication with the DPI. However, I cannot say it is a good life. Like now, when the number of cows decreases, the milk production also decreases. In this case, I want to receive a higher price of milk from the DPI. I often personified cooperatives and DPI as husband and wife. Why don’t we have any legal ties of marriage while in fact we live together?” (Secondary Dairy Cooperative 111)

At present, there is no public inspection authority as a part of the public institutions which govern milk marketing in the Indonesian dairy industry. The absence of regulation might result in market failure in the industry. In addition, this situation can increase the transaction costs due to the asymmetric information and opportunistic behaviour of agents could result from it. For example, there are still many DPIs which acquire milk without any quality standard and without any commitment to Indonesian national standard (SNI). As a result, it is hard to increase the quality of milk in such a downward cycle. For instance, when the cooperative gives a lower price to the farmers due to the more inferior quality of their milk, the farmers sell their milk to collectors whose milk is also accepted by DPIs.

East Java. Nestlé has become the biggest dairy processing industry with a plant capacity of about 1.2 million liters per day. In East Java, Nestlé is now the dominating DPI and has signed written contracts with 41 cooperatives. This company purchases fresh milk from farmers at an amount of around 578 tons per day (the Nestlé’s share is about 34% from the total 1,700 ton per day of SSDN¹³). The written contracts have become an instrument for the realization of Nestlé’s partnership programs such as Technical Assistance (TA) and Financial Assistance (FA). To secure quality, this DPI established the so-called ‘standard operating procedures’ (SOPs) to define the technical requirements in milk handling by cooperatives and by dairy farmers. Of utmost importance in the product quality regulation is the determination of the milk price paid to the cooperatives based on the quality parameters of the milk delivered.

Nestlé designed the contract with cooperatives on a year by year basis. After a year, both parties can stop or extend the contract. Cooperatives tend to extend the contract with Nestlé because they have little choice and also feel quite comfortable with the partnership system of Nestlé. This suggests that relationships between processors and farmers (cooperatives) in the East Java dairy sector are rather stable. This phenomenon is explained by some cooperative’s leaders who were interviewed:

“Most of the milk is sold to Nestlé because the company provided us with the price bonus in quality and quantity. We do not prefer to sell our milk to another region such as West Java because the milk payments are often delayed. Nestlé always pays us on time. We have a long-time relationship with the company, since 1979. Although there are ups and downs as well (the cooperative had to stop due to an imbalance of milk deliveries). Nestlé has invested in the cooling units and assisted us in corporate social responsibility activities in the form of biogas credits” (Primary Cooperative 321).

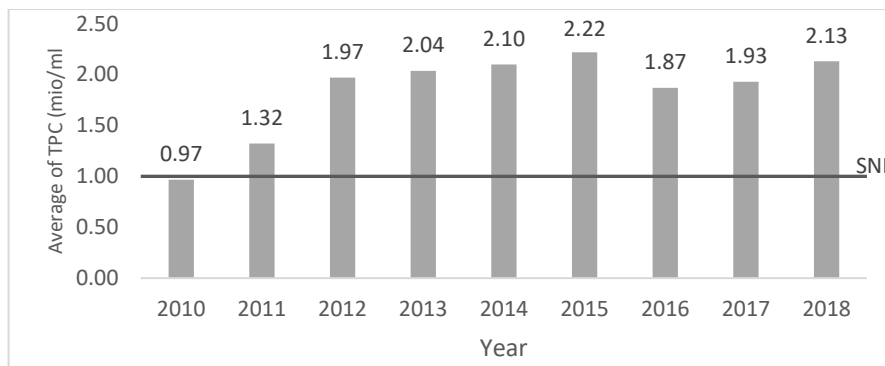
¹³ SSDN (Susu Segar Dalam Negeri): Fresh milk which is produced domestically.

“It now looks clear that Nestlé became a dominant player, but when viewed from another perspective, Nestlé actually had a good proposition in terms of coaching and partnerships. But for milk price setting we hope we have a chance to compare it with other DPIs as well. On the other hand, this DPI helps in looking for a cooling unit with higher quality standards”. (Primary Cooperative 331)

“In the beginning of the year, Nestlé always invites us to draw up annual programs which become our target on that year. Nestlé not only did transactions with the cooperatives, but also participated in partnership and coaching”. (Primary Cooperative 331)

Quality improvement: driving forces and obstacles. Improving quality is a critical factor in dairy industry development in addition to the increase in productivity. Poor quality handling leads to lower milk prices for the farmers. The failures of milk quality handling in Indonesia brought a potential loss/opportunity cost of US\$ 4,6 million/month (Stanton et al. 2005). Field observations indicated that most of the farmers still get a lower price because they are not able to meet the quality standards that are targeted. This inability might be due to individual problems of farmers or to collective problems experienced by the cooperatives.

Industries interviewed explained that improving milk quality was the main objective of their farm assistance programs. Although quality improvement programs were implemented it is still difficult in West Java to improve the milk quality standard especially the microbial content (number of TPC). Figure 4 shows that the average number of TPC content in the periods 2010-2018 is still above one million microorganisms per ml of milk, and it is above the maximum required by SNI. In this region, only few cooperatives reached the high-quality standard of milk, for instance KPSBU.

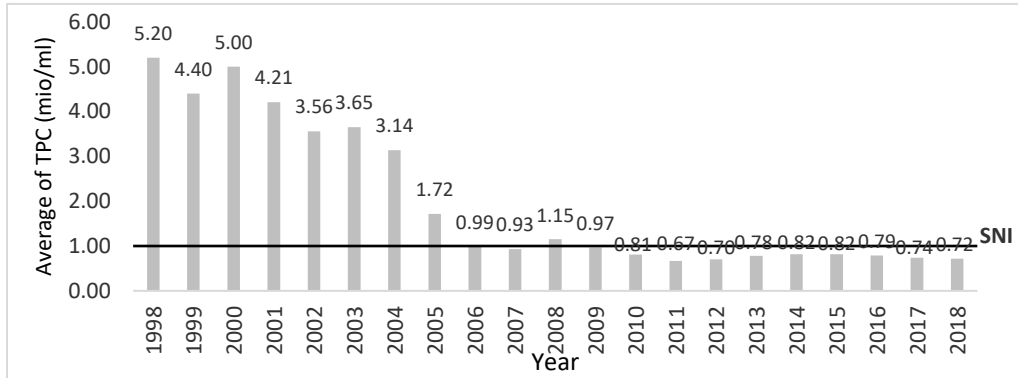


Source: Union of Dairy Cooperatives annual report (2010 – 2022)

Fig. 4. Milk quality improvements in West Java (based on Total Plate Count/TPC)

It is difficult to improve the milk quality standard in West Java because there is still an industry that accepted low quality milk and paid attractive prices. The manufacturers also buy fresh milk from milk collectors in addition to milk collection from the dairy cooperatives. In collecting fresh milk, the collector must compete with the cooperatives, because most of the farmers are members of cooperatives. To attract the farmers, the collectors propose a higher price and apply lower standard of milk quality compared to the cooperatives. As a result, farmers are not motivated to make any investment in quality improvement. Weak infrastructure also caused difficulties in improving milk quality in West Java. Due to the limited funds available, cooperatives could not build adequate infrastructures such as a cooling unit and a milk laboratory. In addition, the DPIs could not provide enough credit for the cooperatives because they have no legal guarantees where both parties have not signed a written contract.

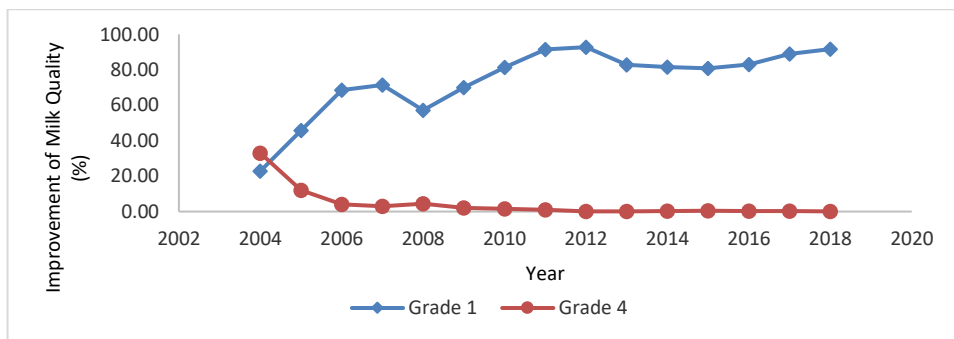
In contrast, the milk quality development in the dairy supply chain in East Java showed positive effects. There are clear indications that the quality of milk produced by farmers in East Java improved recently in terms of TPC (Fig. 5). TPC tend to decrease and since 2006 and it reached below one million bacteria per ml which is higher than the SNI standard.



Source: Nestlé 2013 and update it in 2018

Fig. 5. Milk quality improvements in East Java (based on Total Plate Count/TPC)

Moreover, the partnership program supported by the agri-services (the MPDD) improved milk quality in East Java. When the program started in 2004, most farmers had grade IV and after nine years, it improved to grade I and stayed at that level continuously in recent years (Fig. 6). The milk quality grade is determined on the basis of two parameters; the value of TS and TPC content. It can be assumed that this improvement is a result of significant investment of cooperatives on the basic infrastructure such as a cooling unit, a milk laboratory and standardized MCC and by the training and better management of the farmers. The cooperatives provided the basic infrastructure, assisted by Nestlé in the partnership program. In recent years, by implementing vertical coordination, Nestlé invested considerably in new technology and plant capacity to improve its production efficiency, as well as to improve its production facilities to comply with international and national standards. In addition, the industry applied a feed incentive in the milk price (called feed bonus) received by cooperatives. The incentives were given in the form of raw material used by cooperatives to produce feed concentrate. It stimulates the cooperatives to supply the farmers with good quality feed which potentially result in a high composition of milk especially TS.



Source: Nestlé 2013 and update it in 2018

Fig. 6. The improvement of milk quality (milk grade) in East Java (2004-2018)

Table 1 gives a summary that compares West Java and East Java with respect to enhancing performance in the dairy industry, particularly in fresh milk quality.

Table 1. Comparison of strengths and weaknesses in promoting improved milk quality between West Java and East Java.

Region	Strength	Weakness	Outcome/Recommendations
West Java	<ul style="list-style-type: none"> - Has Stronger Cooperatives - close to the country's capital (faster and easier access to government assistance) 	<ul style="list-style-type: none"> - More Competition between DPIs - Some farmer development programs (FFI, Ultrajaya, etc.) - Distribution of Milk Collection Centers (MCCs) at low level (difficult to handle milk and potentially causing high bacterial counts) - No Contract or Informal Contract (it is difficult to implement SOPs to improve milk quality without a contract) 	<ul style="list-style-type: none"> - more challenging to put milk quality improvement programs into action. - Transparency and formal contract implementation require additional attention. - Enhancing the participation of multinational corporations in CSR
East Java	<ul style="list-style-type: none"> - Less competition between DPIs - Larger farmer development programs - Many Milk Collection Centers (MCCs) distributed (makes it easier to handle milk and prevents an increase in the number of bacteria) - Contract (makes it easier to implement SOPs to improve milk quality without contracts and investment in providing milk infrastructure such as MCC). 	<ul style="list-style-type: none"> - Medium and smaller cooperatives - far from the country's capital 	<ul style="list-style-type: none"> - Programs to improve milk quality are simpler to implement. - Strengthening and increasing the role of dairy cooperatives

CONCLUSIONS

The Indonesian dairy industry is facing important changes in its milk production and market, but also in government regulations. These changes were driven by the liberalization policies of the Indonesian government and the changes and growth in consumer demand for dairy product. The liberalization resulted in an increasing FDI flow and pushed different stakeholders involved to implement a high milk quality policy. In addition, the milk market changed because the growing middle classes with better incomes wanted more and better fresh milk, which is mostly produced by small local farmers, not in possession of modern dairy technologies. More than other food products, dairy depends on upstream quality, from cow feed to cold chain management to the shop shelves. It thus starts with dairy farming, securing a high quality and safe supply. To procure fresh milk with a higher quality from farmers, national and international companies are competing to get and keep access to these farmers. There are three strategies for the processing industry to secure milk supply from the farmers. The first strategy is to procure milk wherever possible, usually called the 'middleman strategy' where by constructing milk collection centers middle men are trying to get milk also from cooperative farmers. The second strategy is to collect milk wherever possible from cooperatives or cooperative members with payments to cooperative leaders, the 'leaders' strategy'. The Third strategy is to build a sustainable relation with coops via the supply of milk collection centers and (cooling) equipment plus additional services (training, capacity building), leading in principle to transparent contracts, the 'partnership strategy'. A fourth strategy that seems to appear recently and that is not in our analysis, is building a factory together with a large dairy farm, the 'Mitsui strategy'.¹⁵

In both regions where most milk is produced in Indonesia, East and West Java, milk processors are confronted with both these phenomena, but the situation is different in both regions in terms of industry structure and cooperative behavior. In East Java a monopolistic situation is found with Nestlé as the major DPI. This could have led to exploitative contracts, but Nestlé has an international Corporate Social Responsibility plan which forces it to have transparent relations and open contracts with primary suppliers. The contract makes it possible for Nestlé to finance MCCs for cooperatives which are repaid by deducting from milk payment. Nestlé was also working closely with development cooperation organizations to build biogas installations. So, Nestlé might be the monopolist in East Java, but they are willing to sustain their relations with fresh milk suppliers by means of contracts. This has finally led not so much to a higher production but to high a quality of milk collected.¹⁶

In West Java there are more players at the supply and the demand side. Formal contracting has not been implemented in this region: cooperatives do not want to close contracts, because they want to offer their milk to the highest bidder and to make profit from price fluctuations. This means that the processing industries when supplying MCCs and training to cooperatives can only control supply through their field managers. This leads to high productivity, because productivity in West Java has always been high from colonial times, but milk quality in West Java has not improved at all.

These situations lead to the fact that we might have had our looking glass at institutional relations but that these could not explain the full situation. There is a need to consider the importance of institutional arrangements, in this case the transparency that arises from contractual relations, vis à vis intermediaries which force companies to another behavior. In Indonesia, milk processors are still

¹⁵ On 21 September, it was announced that Mitsui would go into a joint venture with Raffles Pacific Harvest (the dairy farm) and ABC Kobe (the milk processor) to produce milk in the Bandung area (*Nikkei Asia*, 21 September 2017. Retrieved from: <https://asia.nikkei.com/Business/Business-deals/Mitsui-enters-Indonesian-dairy-market-to-milk-growing-demand>)

¹⁶ In their literature overview of supply chain collaboration Chen et al. (2017) indicate that there is little attention in the literature for social concerns, but also for competition between horizontal collaboration partners.

the dominant player, where elsewhere in Europe or the US it is the supermarket chains (Glover et al. 2014). It is important to note that these phenomena should have their place in institutional economics analysis. Institutional arrangement theory tends to focus on formal relationships, on building trust via contractual obligations. But it is not necessarily so that institutional arrangements, such as contracts, are welcomed by both parties, since relations and thus arrangements might be rather unequal. In that case not only trust and investments in assets, and uncertainty might lead to long-standing relations (Gërdoçi et al. 2017). This might show that bringing Corporate Social Responsibility in the relation could lead to a win-win situation in which both parties value the transparency of clear and open contracts.

ACKNOWLEDGEMENT

This research is part of a PhD dissertation undertaken at Anthropology and Development Studies and Center for International Development Issues Nijmegen, Faculty of Social Sciences, Radboud University, The Netherlands. The authors would like to thank the Japan Indonesia Presidential Scholarship Program (JIPS) World Bank, for providing financing to conduct the research.

REFERENCES CITED

- Altenburg, T. 2006. Governance patterns in value chains and their development impact. *The European Journal of Development Research*. 4(3), pp.498–521
- Arias, G.E.Z. 2007. Quality management and strategic alliances in the mango supply chain from Costa Rica; An interdisciplinary approach for analyzing coordination, incentives and governance. PhD Thesis. Wageningen University.
- Beghin, J.C. 2006. Evolving dairy market in Asia: recent finding and implications. *Food Policy*, 31, 195-200.
- Bijman, J., Muradian, R., and A.D. Cechin. 2011. Agricultural cooperatives and value chain coordination. In A. H. J. Helmsing, and S. Vellema (Eds.), *Value chains, inclusion and endogenous development. Contrasting theories and realities* (pp. 82-101). Routledge.
- CCPHI. 2012. Olah Limbah Menjadi Berkah: Akses Kredit untuk Peternak Susu di Jawa Timur, Indonesia untuk Unit Biogas. Kemitraan antara Nestle Indonesia dan Hivos. Report Case Study Company-Community Partnership Health in Indonesia. Retrieved from <https://ccphi.org/case-study/nestle-indonesia-dan-hivos-olah-limbah-menjadi-berkah-akses-kredit-untuk-peternak-susu-di-jawa-timur-indonesia-untuk-unit-biogas>
- Chen, L., Zhao, X., Tang, O., Price, L., Zhang, S., and Zhu, W. 2017. Supply chain collaboration for sustainability: A literature review and future research agenda. *International Journal of Production Economics*, 194, 73-87.
- Daryanto, A., Sahara, S., Sinaga, A. R., Probokawuryan, M., Andik, S. D. S., Resti, Y., ... & Sembada, P. 2021. Policy Review of Dairy Industry in Indonesia. Available at: https://www.adelaide.edu.au/global-food/ua/media/2207/resources_policy-review-eng.pdf
- Dong, F. 2005. The outlook for Asian dairy markets: the role of demographics, income, and prices. CARD working paper 05-WP 399, June. Iowa State University, Ames
- Dries, L. and Swinnen, J. F. 2004. Foreign direct investment, vertical integration, and local suppliers: Evidence from the Polish dairy sector. *World Development*, 32(9), 1525-1544.

- Dries, L., E. Bacteriaenji, N. Noev, N. and J.F.M. Swinnen. 2009. Farmers, vertical coordination, and the restructuring of dairy supply chains in central and eastern Europe. *World Development*. 37 (11): 1742-1758
- Eaton, D., G. Meijerink and J. Bijman. 2008. Understanding institutional arrangements: Fresh Fruits and Vegetable value chains in East Africa. *Markets, Chains and Sustainable Development Strategy and Policy Paper*, no.XX. Stichting DLO: Wageningen. Available at: <http://www.boci.wur.nl/UK/Publications/>
- Ekumankama, O., Ezeoha, A. and C. Uche. 2020. The role of multinational corporations in local dairy value chain development: case of Friesland Campina WAMCO (FCW) in Nigeria. *International Food and Agribusiness Management Review*. 23(1), 55-69.
- Erwidodo and R. Trewin. 1996. The social welfare impact of Indonesian dairy policies. *Bulletin of Indonesian Economic Studies*. 32(3), 55-84.
- Falkowski, J. 2012. Vertical coordination, access to capital, and producer loyalty in the Polish dairy sector. *Agricultural Economics*, 43(2), 155-164.
- Gërdoçi, B., SKkreli, E. Zhllima, E. and D. Imadi. 2017. Determinants of long-term business relationships in the dairy value chain in transition countries: the case of Albania. *Studies in Agricultural Economics*, 119, 139-147.
- Glover, J., Champion, D., Daniels, K. and A. Dainty. 2014. An Institutional Theory perspective on sustainable practices across the dairy supply chain. *International Journal of Production Economics*, 152, 102-111.
- Götz, L., Hanf, J. H., Pieniadz, A., Glauben, T., Nikolov, D., Njavro, M., and D.M. Voicilas. 2009. Review of approaches fostering productive partnerships in Bulgaria, Croatia and Romania. IAMO, Bacteriaany.
- GKSI. 2012. Laporan Tahunan Gabungan Koperasi Susu Indonesia Tahun 2012 (tidak dipublikasikan)
- Hayer, S. S., Staduto, J. A. R., and D. Darr. 2019. Vertical coordination in the Brazilian milk supply chain: the case of 3B Agro LTDA. *International Food and Agribusiness Management Review*, 22(3), 435-449.
- Hobbs, J.E., Young, L.M., 2000. Closer vertical co-ordination in agri-food supply chains: a conceptual framework and some preliminary evidence. *Supply Chain Manag. An Int. J.* 5 (3), 131-143.
- Hosen, M.N. 2009. Profiles and economic performances of dairy co-operatives in Indonesia; a case study of five dairy co-operatives in Java, 1980-1996. Lambert Academic Publishing.
- Illiopoulos, C. and M.L. Cook. 1999. The internal organization of the cooperative firm: an extension of new institutional digest. *Journal of Cooperatives*, 14, 77-85.
- Kilelu, C. W., Klerkx, L., and C. Leeuwis. 2017a. Supporting smallholder commercialisation by enhancing integrated coordination in agrifood value chains: Experiences with dairy hubs in Kenya. *Experimental Agriculture*, 53(2), 269-287.
- Kilelu, C., Klerkx, L., Omoro, A., Baltenweck, I., Leeuwis, C., and Githinji, J. 2017b. Value chain upgrading and the inclusion of smallholders in markets: reflections on contributions of multi-stakeholder processes in dairy development in Tanzania. *The European Journal of development research*, 29, 1102-1121.

- Moran, J. and P. Morey. 2015. Strategies to increase the domestic production of raw milk in Indonesia and other South East Asian Countries, pp 1-11. In Proceedings of the 6th International Seminar on Tropical Animal Production: Integrated Approach in Developing Sustainable Tropical Animal Production. 20-22 October 2015, Yogyakarta, Indonesia.
- Morey, P. 2011. Indonesia dairy industry development. Final Report for International Finance Corporation. World Bank.
- Nestle. 2013. Create Share Value. Annual Report 2012. Nestle Indonesia, Indonesia. Retrieved from: www.nestle.com/sites/default/files/asset-library/documents/library/documents/corporate_social_responsibility/nestle-indonesia-csv-report-2013.pdf
- Nugraha, D.S. 2010. Extending the Concept of Value Chain Governance: An Institutional Perspective Comparative Case Studies from Dairy. Dissertation. Humbolt Univ. Berlin.
- Remenyi, J. V. 1986. Issues in smallholder tropical dairying. Bulletin of Indonesian Economic Studies, 22(1), 57-87.
- Riethmuller, P., J. Chai, D. Smith, B. Hutabarat, B. Sayaka, Y. Yusdja. 1999. The mixing ratio in the Indonesian dairy industry. Agricultural Economics, 20, 51-56.
- Royer, JS. 1999. Cooperative organizational strategies: A neo-institutional digest. Journal of Cooperatives 14, 44-67.
- Saenger, C., Qaim, M., Torero, M., and Viceisza, A. 2013. Contract farming and smallholder incentives to produce high quality: experimental evidence from the Vietnamese dairy sector. Agricultural Economics, 44(3), 297-308.
- Schärer, M. 2014. Dairy Development, the Responsibility of the Dairy Industry. ^{10th} African Dairy Conference, Nairobi/Kenya. September 24th, 2014 (PowerPoint slides). Retrieved from <https://www.slideshare.net/dairyesada/dairy-development-the-responsibility-of-the-dairy-industrymanu-schrer>
- Staadz. J.M. 1994. A comment on Phillip' 'economic nature of the cooperative association'. Journal of Cooperatives, 9, 80-85.
- Stanton, E. and Sia. 2005. Indonesia's dairy farming industry in 2005: Dairy Australia
- Statistics Indonesia. 2021. Data of Number of Dairy Cattle in Indonesia. Accessed at <https://www.bps.go.id/indicator/24/470/1/populasi-sapi-perah-menurut-provinsi.html>
- Swinnen, J. F. M. and Maertens, M. 2007. Globalization, privatization, and vertical coordination in food value chains in developing and transition countries. Agricultural Economics, 37: 89–102.
- Swinnen, J.F.M. 2007. The dynamics of vertical coordination in agri-food supply chains in transition countries. Book Global Supply Chains, Standards and the Poor.
- Szabó, G. G., and Popovics, P. 2009. Possible ways of market coordination and integration in the Hungarian dairy sector. Journal of Rural Cooperation, 37(886-2016-64695), 32-51.
- Tetra Pak. 2014. Promoting dairy industry growth in Indonesia. Report i3L Dairy Program. Tetra Pak Indonesia.

- USDA-FAS. 2021. Indonesia 2021 Dairy and Products Annual Report. Gain Report No. ID2021-0039; October 2021
- Van Berkum, S. 2007. Vertical coordination in the dairy sector: a comparative analysis of Romania and Slovakia. In: *Global supply chain standards and the poor. How the globalization of food system and standards affects rural development and poverty*. ed. J.F Swinnen (2006), Cambridge MA: CABI
- Williamson, O.E. 1985. *The Economic Institutions of Capitalism*. New York: The Free Press.
- Yin, R. K. 2004. Case study methods. 3rd edition of *Complementary Methods for Research in Education*, The American Educational Research Association, Washington DC.
- Zhong, Z., Zhang, C., Jia, F., and J. Bijman. 2018. Vertical coordination and cooperative member benefits: Case studies of four dairy farmers' cooperatives in China. *Journal of Cleaner Production*, 172:2266-2277.