Performance analysis and strategic planning of dairy supply chain in Indonesia

A comparative study

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Abstract

Purpose – The purpose of this paper is to measure and evaluate the performance of the relationships between farmers, dairy cooperatives and industrial milk processors.

Design/methodology/approach – Data used in this study were primary data collected through personal interviews and closed questionnaires with 1–5 Likert scale. The sample consisted of the representative of the management of 12 dairy cooperatives located in Central Java Province, representative of the management of 12 dairy cooperatives located in West Java Province and some farmers who are members of those dairy cooperatives. This study uses balanced supply chain management scorecard for measuring the performance of dairy supply chain, importance-performance analysis (IPA) for identifying the indicators that are most in need of improvement, and strength, weakness, opportunity and threat (SWOT) analysis for formulating strategic planning.

Findings – The results of balanced supply chain management scorecard combined with IPA analysis showed that the performance relationship between farmers, dairy cooperatives and industrial milk processors in West Java Province is slightly better than that in Central Java Province. It can be seen from the average value of the score of indicator, the category of each indicator and the category of the performance index of each relationship. The major weakness of the relationship between dairy farmers, cooperatives and industrial milk processors in Central Java Province lies in the different perspective (no perspective is dominant), whereas that in West Java Province is dominated by the perspective of the customer. On the other hand, the major strength of the relationship in Central Java Province is dominated by the perspective of the customer, whereas that in West Java Province is dominated by the perspective of learning and growth.

Research limitations/implications – The limitation of this study is related to the number of the dairy cooperatives as the sample and the type of scale used to measure the performance of the relationships between farmers, dairy cooperatives and individual milk processors. So, the future research may replicate this study by surveying all the dairy cooperatives in Central Java and West Java Provinces. It may also enhance the measurement of the performance of the relationships by using a direct measure of each indicator in each perspective, rather than recording the management of dairy cooperative perceptions.

Practical implications – This research provides essential insights for the management of dairy cooperative in the context of strategic planning development. The research reveals that there is a different strategic planning for improving the performance of the relationship between dairy farmers, cooperatives and industrial milk processors in each province. It depends on the major weakness and strength of the relationships, and also, opportunity and threat faced by the dairy industry. One important thing, the management of dairy cooperative in both provinces should have strategic planning related to the use of machine milking by farmers to improve the milk quality.

Social implications – The research revealed that strategic planning could be built after analyzing the internal and external conditions carefully. It may encourage more dairy cooperatives to measure and analyze the internal and external conditions at the bottom of strategic planning of their business.

Originality/value – Although this research only used the balanced supply chain management scorecard and IPA analysis for measuring the performance, and SWOT analysis in formulating the strategic planning for improving the current performance, it will make a difference. First, instead of measuring the performance of dairy cooperatives, this research measured the performance of the relationships between dairy farmers, cooperatives and industrial milk processors. This way, the dairy cooperatives were only sources of data collection. Second, the investigation was quite complicated since the objects of the research were represented by the relationships between farmers, dairy cooperatives and industrial milk processors in Central Java Province and West Java Province.

Keywords Performance, Balanced scorecard, Supply chain management

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1. Introduction

Neely *et al.* (2000) defined a performance measurement system as the set of metrics used to quantify the efficiency and effectiveness of actions. Research on performance measurement mostly focused on the single company. However, in the last few years, the focus has shifted to incorporate a supply chain perspective with several performance measurement systems proposed. In this case, performance measurement is helpful in the improvement of the performance of the supply chain (Chan and Qi, 2002). Supply chain performance measurement can be seen as a set of metrics indicating how well the supply chain system is functioning. Measuring the supply chain performance can facilitate greater understanding of the supply chain and improve its overall performance (Charan *et al.*, 2008). Designing an effective supply chain performance, which can evaluate the performance of the whole supply chain, is important due to a number of reasons namely increase in middleman income, customer value orientation, global competition, stakeholder needs, technology and international rules and regulations (Shashi and Singh, 2015). Besides, supply chain consists of different levels, namely supplier, manufacturer, distributor and consumer, and it is a network of companies influencing each other and affecting one another's performance (Bigliardi and Bottani, 2010).

Measurement of supply chain performance was introduced in the 1990s, which is based on time and inventories. Levy (1995) introduced performance measures such as average finished goods inventory and demand fulfillment. Christopher (1992) introduced supply chains performance measures such as order cycle time, order completeness and delivery reliability. Meanwhile, delivery performance, lead time, level of defects and responsiveness were Lambert's and Sharma's approach to supply chain performance measures (Lambert and Sharma, 1990). Cohen and Lee (1990) introduced material inventory, work in process inventory, finished goods inventory, and fill rates, stock out frequencies and lead time measures. Davis presented inventory levels, inventory investment, order fill rate, line item fill rate and an average number of day's late measures.

In the 2000s, the measurement of supply chain management performance has used different approaches. Shepherd and Günter (2006) categorized studies on this topic into operational, design and strategic research. Operational research develops mathematical models for improving supply chain performance (Lin *et al.*, 2005; Smith *et al.*, 2005). Design research focuses on optimizing performance through redesigning the supply chain (Shepherd and Günter, 2006). It can be categorized according to the type of research models, such as deterministic analytical models (Chen *et al.*, 2005), stochastic analytical models (Chiang and Monahan, 2005), economic models (Wu, 2005) and simulation models (Hwarng *et al.*, 2005; Reiner, 2005). Meanwhile, strategic research evaluates how to align the supply chain with a firm's strategic objectives (Balasubramanian and Tewary, 2005). In this category, some authors have been using balanced scorecard (BSC) approach as an appropriate tool for the measurement. Also, a modified version of the BSC has been used by some researchers, such as Brewer and Speh (2001), Kleijnen and Smits (2003) and Park *et al.* (2005). This modified version is named by Park *et al.* (2005) as balanced supply chain management scorecard (balance SCM scorecard).

In this research, balanced supply chain management scorecard has been applied in measuring the performance of the relationships in the dairy supply chain. Moreover, related with strategic objective, this research has utilized the results of performance measurement and combined with importance-performance analysis (IPA) as a starting point to formulate some strategic planning for the indicators that are in need of improvement the most. In this case, strength, weakness, opportunity and threat (SWOT) analysis has been used as a method for formulating the strategic plans. The dairy supply chain is chosen as the context for the measurement because its performance has received a great deal of attention in the last decade, due to issues related to food self-sufficiency and dairy supply chain need to formulate the strategy to achieve the target established by the Government of Indonesia.

To achieve food self-sufficiency, the Indonesian Coordinating Ministry of Economy launched the Road Map of Indonesian Dairy 2015–2025 in February 2014. According to the roadmap, the production of milk should achieve 2.75 million tons in 2020 and 5.32 milk tons in 2025. Besides, dairy cattle should achieve 1.3m heads, which will produce an average daily production of 13.11 liters of milk per day in 2020 and dairy cattle should achieve 1.7m heads, which will produce an average daily production of 19.67 liters per day in 2025 (Wright and Meylinah, 2014). It has become apparent that shortly the dairy supply chain in Indonesia will need to formulate a strategy to achieve the target and also to systematically identify the most appropriate metric that has a high impact on the target achievement. Then, the relationship between individual farmers, dairy cooperatives and industrial milk processors has become the focus of the measurement because of the dominance of those three actors in the supply side of the dairy supply chain. The amount of individual dairy farmers in Indonesia has reached 192,160 farmers (Morey, 2011). The majority milk production from dairy farmers is marketed through local dairy cooperatives, and then they sell it to the industrial milk processors (Susanty *et al.*, 2017).

Shortly, to implement balanced supply chain management scorecard in measuring the performance of the relationship between individual farmers, dairy cooperatives and industrial milk processors in the dairy supply chain and also to propose some strategy to achieve the target of the government, this study has several objectives. First, this study aims to measure current performance of the relationship between individual farmers, dairy cooperatives and industrial milk processors with the proposed balance SCM scorecard. Second, this study aims to develop IPA to identify the indicators that are most in need of improvement. The last, this study aims to utilize SWOT analysis to formulate strategic plans. So, the research questions are as follows:

RQ1. How would the current performance of the relationships between individual farmers, dairy cooperatives, and industrial milk processors be if measured by balance SCM scorecard?

RQ2. Which indicators in the relationships between individual farmers, dairy cooperatives, and industrial milk processors are in need of improvement the most?

RQ3. What strategic plan should be formulated to improve the performance of the relationships between individual farmers, dairy cooperatives, and industrial milk processors?

The remainder of the paper is structured as follows. The next section describes the literature review about various metrics used in balanced supply chain management scorecard and is followed by the discussion of the research methodology, such as the objects of the research, instrument and measurement, data collection procedures and data processing techniques. The results are discussed subsequently. Finally, the theoretical and managerial implications and the limitations of the study are presented in conclusion, along with the future research directions.

2. Literature review

BSC was introduced by Kaplan and Norton in the early 1990s. The BSC is considered as the method to operationalize a business's vision and strategy. The BSC is seen as an answer to the limitations of using the measurements system that is historically based and cannot be used to assist the manager moving forward (e.g. financial ratios). The BSC tries to take objective value to the non-financial measures such as customer satisfaction and operational processes. In detail, there are four broad perspectives associated with BSC, namely, customer, internal business processes, innovation and learning or leaning and growth and financial perspectives (Kaplan and Norton, 1996; Mathiyalagan *et al.*, 2014).

According to several authors, the four perspectives of BSC are suitable for overcoming the problems related to performance measurement in the supply chain. The modified

version of a BSC for measuring supply chain performance is named by Park *et al.* (2005) as balanced supply chain management scorecard (balance SCM scorecard). Besides, studies exploring the application of the BSC as a performance measurement system for the performance management of SCs are cited in several other studies, such as those of Brewer and Speh (2000, 2001), Kleijnen and Smits (2003), among others. Although the application of the BSC as a performance measurement system for SCM can be found in several authors, there is no consensus about the indicators used in each perspective on the balanced SCM scorecard. In detail, several indicators in each perspective which are used by previous researchers can be seen in Table I.

3. Methods of the research

Object of the research

The objects of this research are dairy milk supply chains in Provinces of Central Java and West Java. These provinces are two among three provinces as the largest milk producers in Indonesia. According to Morey (2011), there are 97,589 cows in Central Java, located in Boyolali and Semarang regions producing 77.1 tons of milk per year. In West Java, there are 58,001 cows, located in Bandung, Lembang, Pangalengan, Sumedang, Kuningan and Garut regions producing 126,221 tons of milk per year. The sample of this research is represented by 24 dairy cooperatives consisting of 12 cooperatives out of 24 active dairy cooperatives located in Boyolali and Semarang and 12 cooperatives among 18 active dairy cooperatives located in Lembang, Pangalengan, Sumedang and Garut. Although the sample size is only 24, those cooperatives can represent the condition of the relationship between farmers, cooperatives, and industrial milk processors in every province since 80 percent of the milk produced from Central Java and West Java Provinces comes from those cooperatives. In each of the selected dairy cooperative, one person from the management has represented the cooperative as the source of information. Moreover, one of the dairy farmers among the members of each selected dairy cooperative has also been chosen to represent farmers.

This research has used non-probability purposive sampling for selecting the dairy cooperative and also for selecting the representative of management. Hence, the selection of dairy cooperative and representative of the management of each dairy cooperative as the sample is based upon certain appropriate characteristics. For dairy cooperatives, this research chooses the dairy cooperative belonging to 80 percent of the milk producer in Central of Java and West Java Provinces. Concerning the characteristics of the representatives of management, they should be within the cooperative for more than five years, or they should be in the management position for more than three years. The inclusion characteristics of the representatives of management for filling out the questionnaire were as follows: they should have the knowledge about the condition of relationship between dairy farmers, cooperatives and industrial milk processor; they should have the knowledge about the current condition of the cooperative; and, they should have time to participate in the research. From each of cooperative, this research will collect the data needed for measuring the current condition of the relationship between dairy farmers, cooperatives and industrial milk processors which is where the cooperative sells its milk. In this case, the selected dairy cooperatives mentioned previously have been the focal point of data collection because they have intent relationships with individual dairy farmers as members of the cooperatives. The selected dairy cooperatives also have determined relationships with industrial milk processors since they market their milk to the processors. The information from the dairy farmers was used as the other source to validate some information received from the cooperatives.

Instrument and measurement

A total of 28 indicators have been used in this research. They were used to measure the four perspectives, i.e., customer (ten indicators), financial (six indicators), internal business process (four indicators) and learning and growth (eight indicators) perspectives. For the

Perspective	Reference	Metrics
Financial	Santos *et al.* (2006)	Material acquisition costs; non-quality costs; warehousing costs; manufacturing unit costs; cost of carrying inventory; logistics cost; transportation costs; cash flow; EBITDA; income; EVA (economic value added); operating ratio; return on investment- ROI; revenue per employee; and return on asset
	Bhagwat, and Sharma (2007)	Net profit vs productivity ratio rate of return on investment; variations against budget; buyer-supplier partnership level; delivery performance; supplier cost-saving initiatives; delivery reliability; cost per operation hour; information carrying cost; and supplier rejection rate
	Bigliardi and Bottani (2010)	Information carrying cost; supplier cost-saving activities; variations against budget; cost per operation hour; and return on investment
Customer	Santos *et al.* (2006)	Quality – % non-conformity; forecast accuracy; market share; on-time delivery; number of products/distribution channel; and damaged shipments
	Bhagwat, and Sharma (2007)	Customer query time; level of customer perceived value of product; range of products and services; order lead time; flexibility of service systems to meet particular customer needs; buyer-supplier partnership level; delivery lead time; delivery performance; effectiveness of delivery invoice methods; delivery reliability; responsiveness to urgent deliveries; effectiveness of distribution planning schedule; information carrying cost; quality of delivery documentation; driver reliability for performance; quality of delivered goods; and achievement of defect-free deliveries
	Bigliardi and Bottani (2010)	Customer query time; order lead time; distribution lead time; distribution performance; delivery reliability; effectiveness of distribution planning schedule; quality of delivery goods; customer perceived value of product' flexibility of service system to meet particular customer needs, and responsive to urgent delivery
Internal business perspective	Santos *et al.* (2006)	Supplier on-time delivery; material inventories; material quality; supplier cycle time; % of orders delivered according to plan; schedule changes; BOM accuracy; adherence to schedule; % defect products; number of finished products/SKU's; manufacturing cycle time; setups/ changeovers; plant utilization; finished goods inventory turnover; stock keeping units
	Bhagwat, and Sharma (2007)	Total supply chain cycle time; total cash flow time; flexibility of service systems to meet particular customer needs; supplier lead time against industry norms; level of supplier's defect-free deliveries; accuracy of forecasting techniques; product development cycle time; purchase order cycle time; planned process cycle time; effectiveness of master production schedule; capacity utilization; total inventory cost; supplier rejection rate; efficiency of purchase order cycle time; and frequency of delivery
	Bigliardi and Bottani (2010)	Accuracy of forecasting technique; planned process cycle time; purchase order cycle time; effectiveness of master production schedule; supplier rejection rate; total inventory cost; and frequency of delivery
Innovation and learning perspective	Santos *et al.* (2006)	% new product development; social programs investments; absenteeism; % employee training; employee productivity; motivation; and employee turnover
	Bhagwat and Sharma (2007)	Supplier assistance in solving technical problems; supplier ability to respond to quality problems; supplier cost-saving initiatives; supplier's booking in procedures; capacity utilization; order entry methods; accuracy of forecasting techniques; product development cycle time; flexibility of service systems to meet particular customer needs; buyer-supplier partnership level; range of products and services; and level of customer perceived value of product
	Bigliardi and Bottani (2010)	Supplier assistance in solving technical problem; supplier ability to respond to quality problem, buyer-supplier collaboration in problem-solving; order entry method; and level of information sharing

Table I.
Indicators in each perspective from previous studies

customer perspective, the indicators are developed from Hong and Zhong-Hua (2013), Prakash and Pant (2013), National Standard Indonesia (2011), Wright and Meylinah (2014), Callado and Jack (2015) and Susanty *et al.* (2017). As for the financial perspective, the indicators are developed from Callado and Jack (2015), Hong and Zhong-Hua (2013) and Prakash and Pant (2013). The indicators for measuring the perspective of the internal business process are developed from Prakash and Pant (2013). Finally, for measuring the perspective of learning and growth, the indicators are developed from Prakash and Pant (2013), Callado and Jack (2015) and Susanty *et al.* (2017). Some indicators in this research were also developed based on the results of interviews with the representatives of management of the dairy cooperatives.

Based on those 28 indicators, this study has used two types of closed questionnaire:

- The first type is the analytical hierarchy process (AHP) questionnaire. This questionnaire is used to compare the level of importance of each perspective (the perspectives of the customer, financial, internal business process, and learning and growth) and the level of importance of each indicator which belongs to each of the perspectives. The results of this questionnaire have indicated the relative weight of each perspective and indicator that contributes to the relationships between dairy farmers, cooperatives and industrial milk processors. The Saaty's nine-point scale has been used for the first type of questionnaire, ranging from 1(= equal importance between element I and j) to 9 (= absolute dominance of me over j), and reciprocal values, respectively. All values within the range of 1 to 9 and 1/9 to 1 are possible; the respondents were not restricted to the integer data points 1, 2, etc., and their reciprocals (Saaty, 1995).
- The second questionnaire has been used to measure the current condition of each indicator. The five-point Likert scale was used for the purpose. Although the higher the score, the better the condition (1 = the worst condition and 5 = the best condition), the five-point Likert scale used in the study may have different meaning depending on the condition asked on each indicator. As an example, the meaning of value 1 to 5 for the questionnaire "the level of conformity of total plate count (TPC) contained in the milk delivered by the farmers with the limit set by the Indonesian National Standard," can be described as follows. Value 1 means the level of TPC is between 800,001 CFU/ and 1,000,000 CFU/mL; value 2 means the level of TPC is between 600,001 CFU/ and 8,000,000 CFU/mL; value 3 means the level of TPC is between 400,001 CFU/ and 600,000 CFU/mL; value 4 means the level of TPC is between 200,001 CFU/ and 400,000 CFU/mL; and value 5 means the level of TPC is between 1 CFU/ and 200,000 CFU/mL. In detail, list of indicators and their scale can be seen in Table II. The results of the second questionnaire indicate the relative strength and weakness or the relative condition of the internal factor of the relationship between dairy farmers, cooperatives and industrial milk processors. Moreover, based on those internal factors and combined with threat and opportunity faced by dairy industry or external factors, some strategies will be formulated using SWOT analysis. Specifically, the strategy will focus on the indicators that are most in need of improvement.

Data collection procedure

This study has used both primary and secondary data. The primary sources of data were questionnaire and personal interviews. The 24 copies of the first and second type of questionnaire were administered to the representatives of the management of dairy cooperatives in Semarang, Boyolali, Bandung, Lembang, Pangalengan, Sumedang and Garut. Besides the questionnaire, personal interviews have been conducted with the

Table II. Perspectives and indicators of internal factor for measuring the relationship between dairy farmers, cooperatives and industrial milk processor

Dimension	Indicators	Scale
Perspective of customers (CP)		
Customer satisfaction (CP1) (Hong and Zhong-Hua, 2013)	Level of satisfaction of dairy farmers with price offered by the cooperative (CP11) (Susanty *et al.*, 2017)	1 = strongly disagree to 5 = strongly agree
	Level of satisfaction of cooperatives with the commitment of dairy farmers to produce milk with specific quantity (CP12) (Susanty *et al.*, 2017)	1 = strongly disagree to 5 = strongly agree
Compliance to food quality and Codex standards (CP2) (Indonesian National Standard, 2011)	The level of conformity of total plate count (TPC) contained in the milk delivered by the farmers with Indonesia National Standard or SNI (CP21) (Indonesian National Standard, 2011)	1 = 800,001 ⩽ TPC ⩽ 1,000,000 CFU/mL to 5 = 1 ⩽ TPC ⩽ 200,000 CFU/mL
	The level of conformity of total plate count (TPC) contained in the milk delivered by the cooperatives with standard of industrial milk processor (CP22) (SNI 3141.1:2011) (Indonesian National Standard, 2011)	
	The level of conformity of fat contained in the milk delivered by the farmers with SNI (CP23) (SNI 3141.1:2011) (Indonesian National Standard, 2011)	1 = Level of fat ⩽ 3,000% to 5 = Level of fat > 4,500%
	The level of conformity of fat contained in the milk delivered by the farmers with standard of industrial milk processor (CP24) (SNI 3141.1:2011) (Indonesian National Standard, 2011)	
	The level of conformity of Solid Nonfat (SNF) contained in the milk delivered by the farmers with SNI (CP25) (Indonesian National Standard, 2011)	1 = Level of SNF ⩽ 7,800% to 5 = Level of SNF > 8,200%
	The level of conformity of Solid Nonfat (SNF) contained in the milk delivered by the farmers with standard of industrial milk processor (CP26) (Indonesian National Standard, 2011)	
Ease of contact (CP3) (Wright and Meylinah, 2014)	Level of ease of the farmers to get in touch with the cooperatives (CP31) (Susanty *et al.*, 2017)	1 = It is very difficult for farmers to get contact with the cooperatives, even they have critical problem to solve 5 = The farmers can get contact with the cooperatives easily
The loyalty of dairy farmers to cooperatives (CP4) (Callado and Jack, 2015; Susanty *et al.*, 2017)	Duration of farmers to become a member of cooperatives (from interviews with the cooperatives) (CP41)	1 = less than 5 years to 2 = more than 20 years
Perspective of financial (PF)		
Profitability (PF1) (Callado and Jack, 2015; Hong and Zhong-Hua, 2013)	Percentage of profit sharing received by the farmers from selling their milk to cooperatives (From interviews with the cooperatives) (PF11)	1 = less than 1% to 5 = more than 100%

(*continued*)

Table II.

Dimension	Indicators	Scale
	Percentage of profit sharing received by the cooperatives from selling their milk to industrial milk processors (from interviews with the cooperatives) (PF12)	
The net price of products (PF2) (Prakash and Pant, 2013)	Prices and conditions offered by dairy cooperative do not change unexpectedly and it can be seen from the frequency of price changes offered by the cooperatives to the farmers (From interviews with the cooperative; [20]) (PF21)	1 = more than four times in a year to 5 = cooperatives never change the price offered
	Prices and conditions offered by industrial milk processor do not change unexpectedly and it can be seen from the frequency of price changes offered by the industrial processing milk to the cooperatives (From interviews with the cooperatives (PF22)	
Term of payment (PF3) (Prakash and Pant, 2013)	The prices per liter the farmers get from cooperative according to the quality of their milk (PF31) (From interviews with the cooperatives)	1 = less than IDR 4,000 to 5 = more than IDR 5,000
	The prices per liter the cooperatives get from of industrial milk processor according to the quality of their milk (PF32) (From interviews with the cooperatives)	1 = less than IDR 5,000 to 5 = more than IDR 6,000
Perspective of internal business process (BP)		
Planned process cycle time (BP1) (Prakash and Pant, 2013)	Time span between cooling process in the dairy cooperative and milking process (BP11) (Thai Agricultural Standard, 2008)	1 = more than 120 min to 5 = less than 30 min
Quality check of incoming milk and raw materials (BP2) (Prakash and Pant, 2013)	The number of types of quality checking of milk conducted by the cooperative before they sent it to the industrial milk processor (BP21) (from interviews with the cooperatives)	1 = less than three type of quality checking to 5 = more than 13 types of quality checking
Implementation of HACCP and other quality control measures (BP3) (Prakash and Pant, 2013)	The level of implementation of HACCP and other quality control measures by the farmers (BP31) (From interviews with the cooperatives)	1 = no implementation of HACCP and other quality control measures to 2 = have been implementing the HACCP and other quality control measures
	The level of implementation of HACCP and other quality control measures by the cooperatives (BP32) (from interviews with the cooperatives)	
Perspective of learning and growth (LG)		
The level of information sharing (LG1) (Prakash and Pant, 2013; Susanty *et al.*, 2017)	Frequency of information sharing between the farmers and cooperatives (LG11) (From interviews with the cooperatives; Susanty *et al.*, 2017)	1 = no information sharing to 5 = more than four times in a years, conduct regular meeting for sharing the information
	Frequency of information sharing between the cooperatives and industrial processing milk (LG12) (From interviews with the cooperatives)	
Buyer-supplier collaboration in problem-solving (LG2) (Prakash	Level of collaboration in problem-solving between the farmers and cooperatives (LG21) (from interviews with the cooperatives; Susanty *et al.*, 2017)	1 = no collaboration in problem-solving to

(*continued*)

Dimension	Indicators	Scale
and Pant, 2013; Susanty *et al.*, 2017)	Level of collaboration in problem-solving between the cooperatives and industrial processing milk (LG22) (from interviews with the cooperatives)	5 = more than four times in a years, conduct a regular meeting to build a collaboration in solving the problem together
Investment in training (LG3) (Prakash and Pant, 2013; Susanty *et al.*, 2017)	Frequency of training for capacity building from cooperatives to farmers in a year (LG31) (from interviews with the cooperatives) Frequency of training for capacity building from industrial milk processor to the cooperatives in a year (LG32) (from interviews with the cooperatives)	1 = no training for capacity building to 5 = more than 4 times in a years, dairy cooperative (or industrial milk processor) arrange a training for capacity building
Investment in technology (LG4) (Callado and Jack, 2015)	Level of sophistication of equipment used by the farmers for milking process (LG41) (Budiyanto and Usmiati, 2008; Woolford *et al.*, 2004) Level of sophistication of equipment used by cooperative for cooling the milk (LG42) (Roberts and Larson, 1941; Vagany and Dunay, 2004)	1 = no tools used by farmers for milking process to 5 = all farmers have been using Automatic Milking System (AMS) for milking process 1 = no cooling process to 5 = cooperatives have been using cooling unit

Table II.

management representatives for further explanation about the values of the scores in the questionnaire. Interviews have also been used to validate some indicators to the dairy farmers such as the indicator about the level of satisfaction of dairy farmers to the cooperatives, the level of information sharing, the level of collaboration, the frequency of training, etc. The secondary data consist of several documents owned by the cooperatives as a complementary of the results of the questionnaire and personal interviews.

Data processing technique

The data were analyzed using AHP (Saaty, 1995) through Expert Choice Software, Snorm de Boer (Trienekens and Hvolby, 2000) for converting the five-point Likert Scale to the value between 1 and 100. A modified IPA was also used to identify the indicators in need of improvement the most. The application of the IPA was introduced by Martilla and James (1977).

4. Results

Profile of respondents

The profile of 24 dairy cooperatives and their representatives who filled in the questionnaire can be seen in Table III. Half of the representatives of the management were aged between 41 and 55 years old, followed by 61 and 65 years old, 56 and 60 years old, 36 and 40 years old, 60 years old or more and 31 and 35 years old. Concerning the level of education, many of the representatives have a Bachelor's degree, followed by senior high school, diploma, elementary school and only two of them hold a Master's degree. Then, regarding the duration of working with the cooperatives, many representatives have been with the cooperatives for 16 to 20 years, followed by 5 to 10 years, 11 to 15 years and 26 to 30 years, 21 to 25 years and 31 years or more.

Concerning the dairy farmers as the respondents of this research, all of them were male with aged between 45 and 50 years old, followed by 41 and 45 years old, 51 and 55 years old, 56 and 60 years old, 36 and 40 years old, 61 years old or more and 31 and 35 years old. Regarding their duration of working, many respondents have been farmers for 21 to 25 years, followed by 5 to 10 years and 16 to 20 years, 31 to 35 years, 26 to 3 years and 36 to 40 years. Then, most of the respondents have senior high school education, followed by senior high school, bachelor degree and elementary school.

The result of computing the priority weight of each perspective and indicators

After obtaining the individual pairwise judgments from the representatives of the management, the next step was computing the priority weight of each perspective and each indicator using the expert choice software. The results show the approximate priority weight of each perspective and indicator by the individual member of the group of respondents. Then, the final priority weight of each perspective and indicator should be aggregated to arrive at the consensus group. There are several methods to aggregate the opinion of several decision makers. One may choose to aggregate the individual judgments (AIJ) or the resulting priorities (AIP). The choice of methods depends on whether the group is assumed to act together as a unit or as separate individuals. For the first assumption, the geometric mean of aggregate the individual judgments (AIJ) satisfies the reciprocity requirement, implying a synergistic aggregation of individual preferences in such a way that the group becomes a new "individual" and behaves like one. Individual identities are lost with every stage of aggregation, and the Pareto principle is irrelevant. When group members act as individuals (AIP), Dong *et al.* (2010) gives the following formula to aggregate the priorities weight of several decision makers. Let $w^{(k)} = (w_1^{(k)}, \ldots, w_n^{(k)})^T$ be the individual priority vector derived from individual judgment matrix $A^{(k)}$ using certain prioritization method. Then, the aggregate of the priorities weight of several decision

Table III.
Profile of dairy cooperatives and representatives of the management

No.	Name of cooperative-location	Average milk production per month (kg)	Characteristic of representative management			No.	Name of cooperative (location)	Average milk production per month (kg)	Characteristic of representative management		
			Age (years)	Level of education	Duration working in cooperative (years)				Age (years)	Level of education	Duration of working in cooperative (years)
1	Mardi Mulya (Mojosongo)-Boyolali	998.194	42	Bachelor Degree	12	13	KPSBU-Lembang	4.378.772	53	Bachelor Degree	24
2	Andini Luhur-Semarang District	927.000	65	Bachelor Degree	18	14	Puspa Mekar-Bandung	354.200	40	Senior high school	16
3	Musuk-Boyolali	873.234	35	Bachelor Degree	15	15	Mitra Jaya-Bandung	186.390	48	Mater Degree	17
4	Wahyu Agung-Semarang District	710.700	45	Bachelor Degree	8	16	KPBS-Pangalengan	2.439.862	37	Senior high school	12
5	Cepogo-Boyolali	235.767	65	Bachelor Degree	29	17	Sinar Jaya-Bandung	86.361	50	Bachelor Degree	26
6	Getasan-Semarang District	235.767	53	Bachelor Degree	5	18	Sarwa Mukti-Bandung	217.775	47	Bachelor Degree	25
7	Sumber Karya - Semarang District	221.028	41	Bachelor Degree	7	19	Tandangsari-Sumedang	670.065	56	Bachelor Degree	28
8	Banyumanik-Semarang City	117.884	66	Master Degree	6	20	Cikajang-Garut	735.940	65	Senior high school	14
9	Ngudi Luhur-Semarang District	108.150	49	Master Degree	18	21	Bayongbong-Garut	719.946	58	Bachelor Degree	34
10	Mekar-Ungaran, Semarang District	88.405	63	Bachelor Degree	10	22	Saluyu-Kuningan	320.103	51	Diploma	30
11	Kota-Boyolali	58.957	52	Bachelor Degree	25	23	Karya Nugraha-Kuningan	877.860	41	Senior high school	16
12	Subur-Gunung Pati, Semarang City	29.479	58	Bachelor Degree	35	24	Larasati-Kuningan	150.000	72	Elementary school	19

makers obtained is $w^{(c)} = (w_1^{(c)}, w_1^{(c)}, \ldots, w_n^{(c)})^T$ (Dong *et al.*, 2010) in the following equation:

$$w_i^{(c)} = \frac{\prod_{k=1}^{m} \left(w_i^{(k)}\right)^{\gtrdot k}}{\sum_{i=1}^{n} \prod_{k=1}^{m} \left(w_i^{(k)}\right)^{\gtrdot k}}, \quad (1)$$

where $w_i^{(c)}$ = the aggregate of priority weight of the indicator i; k, the priority weight from the individual decision makers k ($k = 1, 2, 3, \ldots, m$); m, the number of decision maker; i, indicator i ($i = 1, 2, 3, \ldots, n$); n, the number of indicators; $\gtrdot$, weight vector of decision makers (in this research, the value of $\gtrdot$ is equal to 1 because all decision makers have the same priority to answer the question).

This study has chosen to use AIP than AIJ because the group that consists of dairy cooperatives from several districts in the Provinces of Central Java and West Java is not homogenous and the decision makers are not willing to act like one single individual. In this case, perhaps the decision context regarding the priority weight of each perspective and indicator is attended by a conflict of interest, and each dairy cooperative as the group member is individually acting with its value systems.

The results in the Province of Central Java show that the perspective of the customer has the highest priority weight (0.752), followed by the financial perspective (0.133), the perspective of learning and growth (0.105) and the perspective of the internal business process (0.01). On the other hand, those in the Province of West Java show that the perspective of learning and growth has the highest priority weight (0.9854183) followed by the perspective of the customer (0.0145565), the perspective of the internal business process (0.0000238) and the financial perspective (0.0000015). In detail, the results of the aggregation of the priority weight from the representatives of the management of dairy cooperatives can be seen in Table IV.

In the Province of Central Java, based on the rearranged priority weight in descending order, the top five ranks of the indicators are: the level of satisfaction of cooperatives with the commitment of dairy farmers to produce milk (CP12) (0.35736400600); the duration of farmers to become a member of cooperatives (CP41) (0.33878001465); frequency of training for capacity building from cooperatives to farmers (LG31) (0.10134217904); percentage of profit sharing received by the farmers from selling their milk to cooperatives (PF11) (0.07971709706); and percentage of profit sharing received by the cooperatives from selling their milk to industrial milk processors (PF12) (0.05322452827). In the Province of West Java, the top five ranks are: the level of collaboration in problem-solving between the farmers and cooperative (LG21) (0.6261700018532); the level of sophistication of equipment used by cooperative for cooling the milk (LG42) (0.17814203984952); the frequency of training for capacity building from cooperatives to farmers (LG31) (0.17328713847026); the duration of farmers to become a member of cooperatives (CP41) (0.0090715025267); and the frequency of information sharing between the farmers and cooperative (CP11) (0.00750674256926). It is apparent that the representatives of the management in both provinces agree about the importance of the duration of farmers in becoming members of the cooperatives and the frequency of the training for capacity building from the cooperatives to farmers.

Result of the performance measurement of the relationships between dairy farmers, cooperative and individual milk processor based on balanced supply chain management scorecard

The aggregate value of the performance of the relationship between dairy farmers, cooperatives and individual milk processors in each dairy cooperative is the sum of the performance index of each indicator, which represents multiplication between the score

Central Java Province Perspective (priority weight)	Indicators	Global priority weight	West Java Province Perspective (priority weight)	Indicators	Global priority weight
Customer (0.7522390)	CP11	0.03573640060	Customer (0.0145565)	CP11	0.00424202811240
	CP12	0.35736400600		CP12	0.00000000052714
	CP21	0.00501587722		CP21	0.00008222012712
	CP22	0.00001052400		CP22	0.00000549322664
	CP23	0.00587329515		CP23	0.00000000072848
	CP24	0.00014568638		CP24	0.00000000003928
	CP25	0.00819161620		CP25	0.00000000000008
	CP26	0.00033146386		CP26	0.00000000000001
	CP31	0.00079011918		CP31	0.00115521724745
	CP41	0.33878001465		CP41	0.00907150252679
Financial (0.133117655)	PF11	0.07971709706	Financial (0.0000015)	PF11	0.00000000258298
	PF12	0.05322452827		PF12	0.00000000005271
	PF21	0.00000000094		PF21	0.00000000000019
	PF22	0.00001884419		PF22	0.00000001201888
	PF31	0.00011788870		PF31	0.00000000034158
	PF32	0.00003929623		PF32	0.00000148012816
Internal business process (0.009956233)	BP11	0.00089796735	Internal business process (0.0000238)	BP11	0.00000002510941
	BP21	0.00905381412		BP21	0.00000000028318
	BP31	0.00000000506		BP31	0.00002373827518
	BP32	0.00000444648		BP32	0.00000000000815
Learning and growth (0.104687108)	LG11	0.00333633102	Learning and growth (0.9854183)	LG11	0.00750674256926
	LG12	0.00000372486		LG12	0.00000000002255
	LG21	0.00000000097		LG21	0.62617000185320
	LG22	0.00000000087		LG22	0.00000005109384
	LG31	0.10134217904		LG31	0.17328713847026
	LG32	0.00000073110		LG32	0.00000001413978
	LG41	0.00000005474		LG41	0.00031229066579
	LG42	0.00000408577		LG42	0.17814203984952

Table IV. The results of aggregation of the priorities weight from several representatives of management of dairy cooperative in the provinces of Central Java and West Java

value of indicators with the weight of the indicator. In this research, before aggregation, the score value of each indicator will be equalized using normalization process (Snorm) of DeBoer (Trienekens and Hvolby, 2000), so the measurement scale from 0 to 100 for each indicator could be obtained. After normalization process, the value of each indicator and the aggregate value of the performance can be grouped using interval value from Trienekens and Hvolby (2000) which consists of poor (score $\leqslant 40$), marginal ($40 <$ score $\leqslant 50$), average $50 <$ score $\leqslant 70$, good ($70 <$ score $\leqslant 90$) and excellent (score > 90). This interval value was used because Trienekens and Hvolby (2000) also used this interval value for measuring the performance in supply chain although they did not use balanced supply chain scorecard as a framework. The Snorm equation of DeBoer for normalization process can be seen in in the following equations:

$$\text{If larger is better, then Snorm} = (S_i - S_{\min})/(S_{\max} - S_{\min}) \times 100, \quad (2)$$

$$\text{If lower is better, then Snorm} = (S_{\max} - S_i)/(S_{\max} - S_{\min}) \times 100, \quad (3)$$

where S_i is the actual score of each indicator; $S_{\min}$, the minimum score; and $S_{\max}$, the maximum score.

Larger-is-better is used when the higher observed value represents better performance, as in the case of indicator CP11 (level of satisfaction of dairy farmers with the price offered by the cooperative). Below is an example of the calculation to get the measurement scale of 0–100 of the indicator CP11 for the Dairy Cooperative of Mojosongo in Boyolali with the larger-is-better in the following equation:

$$\text{Larger is better}: \ \text{Snorm} = (S_i - S_{\min})(S_{\max} - S_{\min}) \times 100, \tag{4}$$

where $((4-1)(5-1)) \times 100 = 75$.

On the other hand, lower-is-better is used when the lower value represents better performance. In this study, lower-is-better is not used to get the measurement scale of 0–100 of the indicators since the best condition of each indicator is achieved when the indicator can get the highest value. In detail, the score of each indicator from each dairy cooperative in Central Java and West Java Provinces after converted to the measurement scale of 0–100 can be seen in Tables V and VI. Then, Tables VII and VIII show the performance index of each indicator (multiplication between the score value of the indicator with its priority weight) and the aggregate value of the performance of the relationship in each surveyed dairy cooperative.

Table V to Table VII indicate that the relationship between dairy farmers, cooperatives and industrial milk processor in West Java Province is better than that in Central Java. It can be seen from the mean score of all indicators, i.e., 55.43 in Central Java Province and 58.75 in West Java Province. Moreover, Central Java Province is also less in the number of indicators categorized as good and excellent compared with West Java Province. In Central Java Province, only 21.43 percent of the indicators belong to good and excellent categories, and the rest (78.57 percent) is in the categories of poor, marginal, and average. Meanwhile, in West Java Province, 39.29 percent of the indicators are categorized as good and excellent, while 60.71 percent of the indicators belong to the categories of poor, marginal and average.

In line with the results shown in Tables V and VI, those of the calculation of an aggregate value of the performance of the relationships between farmers, cooperatives and industrial milk processors shown in Tables VII and VIII also indicate similar finding. The mean aggregate value in Central Java Province is only 53.97 (belong to average category), whereas that in West Java Province achieves 87.02 (belong to good category). Only two dairy cooperatives in West Java Province have the aggregate value less than 70, while 10 dairy cooperatives have the aggregate value more than 70. It means only 2 from 12 relationships are categorized as average, while the other 10 relationships belong to the good and excellent categories. On the contrary, there are 10 dairy cooperatives in Central Java Province which have the aggregate value below 70, and only 2 dairy cooperatives have the aggregate value more than 70. No dairy cooperative in Central Java Province has the aggregate value more than 90. It means that no dairy cooperative is categorized as excellent.

Result of the IPA of the relationships between dairy farmers, cooperative and individual milk processor

IPA, which is an important and applicable tool for mapping the condition of each indicator based on its performance (x-axis) and importance (y-axis), has been used for determining the indicators that are most in need of improvement. The performance of each indicator is expressed by its score, whereas its importance is expressed by its priority weight. Moreover, the median values of the score and priority weight are used as coordinates for plotting individual indicators on a two-dimensional matrix which has four quadrants (concentrate here, keep up with the good work, low priority, and possible overkill) as shown in Figures 1 and 2. The median values as a measure of central tendency of score and priority weight are theoretically preferable to the means because a true interval scale may not exist.

Table V. The score of indicators from each surveyed dairy cooperative in Central Java Province

		Score of each indicator														
No.	Indicators	Mojosongo	Musuk	Cepogo	Kota	Banyumanik	Subur	Mekar	Sumber Karya	Getasan	Wahyu Agung	Andini Luhur	Ngudi Luhur	Mean	SD	Category
1	CP11	50	75	75	50	50	25	100	75	75	75	75	75	66.67	18.63	Average
2	CP12	50	100	25	100	25	50	100	75	25	75	75	75	64.58	27.87	Average
3	CP21	50	50	25	100	100	25	25	50	75	25	25	25	47.92	27.87	Marginal
4	CP22	50	50	25	100	100	25	25	50	75	50	25	25	50.00	27.00	Marginal
5	CP23	50	50	50	50	25	25	25	50	50	50	50	50	43.75	10.83	Marginal
6	CP24	50	50	50	50	25	50	100	50	50	50	50	50	52.08	16.00	Average
7	CP25	100	0	0	100	25	50	50	75	100	75	50	100	60.42	36.02	Average
8	CP26	100	0	0	100	25	50	100	75	100	75	50	100	64.58	37.44	Average
9	CP31	100	100	100	100	100	100	100	100	75	100	100	100	97.92	6.91	Excellent
10	CP41	50	100	25	75	25	25	50	50	50	0	25	50	43.75	25.26	Marginal
11	PF11	25	25	75	25	25	25	25	50	50	75	50	50	41.67	18.63	Marginal
12	PF12	50	75	75	50	25	25	25	75	75	75	75	50	56.25	20.73	Average
13	PF21	100	25	25	75	50	25	25	75	50	75	25	50	50.00	25.00	Marginal
14	PF22	50	50	25	75	50	25	75	50	50	75	25	50	50.00	17.68	Marginal
15	PF31	50	25	25	25	0	0	25	50	75	50	50	25	33.33	21.25	Poor
16	PF32	50	25	25	25	75	25	0	50	50	75	25	25	37.50	21.65	Poor
17	BP11	50	0	25	0	75	25	0	75	75	75	25	75	41.67	31.18	Marginal
18	BP21	50	25	25	25	50	0	0	50	50	100	50	50	39.58	25.94	Poor
19	BP31	50	50	100	50	0	0	25	50	75	50	50	50	45.83	26.68	Marginal
20	BP32	100	100	100	100	25	0	25	100	100	100	50	50	70.83	36.56	Good
21	LG11	100	75	75	100	25	100	75	75	100	100	75	100	83.33	21.25	Good
22	LG12	100	100	75	100	25	25	0	75	75	100	100	100	72.92	34.55	Good
23	LG21	75	25	100	50	25	100	75	75	100	100	75	75	72.92	25.94	Good
24	LG22	75	100	100	50	25	25	0	75	75	100	75	75	64.58	31.39	Average
25	LG31	50	25	75	50	75	75	25	75	75	100	50	75	62.50	21.65	Average
26	LG32	25	25	0	25	25	25	50	0	50	0	0	0	18.75	18.04	Poor
27	LG41	25	0	0	75	0	0	0	25	25	25	25	25	18.75	20.73	Poor
28	LG42	100	100	100	100	100	100	100	100	100	100	100	100	100.00	–	Excellent
	Mean													55.43	23.31	Average

Table VI.
The score of indicators from each surveyed dairy cooperative in West Java Province

		Score of each indicator														
No.	Indicators	KPSBU	Puspa Mekar	Mitra Jaya Mandiri	KPBS	Sinar Jaya	Sarwa Mukti	Tandangsari	Cikajang	Bayongbong	Saluyu	Karya Nugraha	Koptan Larasati	Mean	SD	Category
1	CP11	58	58	33	50	50	25	42	25	25	42	33	33	40.97	11.49	Marginal
2	CP12	75	25	25	75	50	50	50	25	75	25	25	50	45.83	20.87	Marginal
3	CP21	25	0	25	100	50	0	25	0	50	50	25	25	31.25	28.45	Poor
4	CP22	75	0	25	100	50	0	25	0	50	50	25	25	35.42	31.00	Poor
5	CP23	25	75	50	50	50	50	50	50	75	75	50	0	50.00	21.32	Marginal
6	CP24	25	75	50	50	50	50	50	50	75	75	50	0	50.00	21.32	Marginal
7	CP25	75	75	50	50	25	50	100	25	25	0	75	100	54.17	31.68	Average
8	CP26	75	75	50	25	25	50	100	25	25	0	50	100	50.00	31.98	Marginal
9	CP31	100	100	75	83	50	100	100	100	100	100	100	100	92.36	15.67	Excellent
10	CP41	42	25	17	58	25	42	33	50	75	67	17	58	38.20	17.21	Poor
11	PF11	100	25	25	25	75	25	50	25	50	25	75	25	43.75	26.38	Marginal
12	PF12	100	25	75	25	50	25	50	75	50	25	75	25	50.00	26.11	Average
13	PF21	50	25	100	75	75	100	0	0	0	100	100	75	58.33	41.74	Average
14	PF22	75	25	100	75	75	100	50	100	0	100	100	75	72.92	32.78	Good
15	PF31	75	75	25	50	25	67	33	50	25	25	67	75	53.47	21.46	Average
16	PF32	100	0	0	100	0	0	0	0	0	25	50	0	22.92	39.11	Poor
17	BP11	83	92	25	92	25	58	25	75	100	75	83	58	63.89	27.37	Average
18	BP21	75	100	25	100	50	75	100	75	75	75	50	50	70.83	23.44	Good
19	BP31	75	83	75	100	75	75	92	100	100	100	83	75	84.03	10.93	Good
20	BP32	25	75	75	100	25	100	100	100	100	75	75	75	77.08	27.09	Good
21	LG11	100	25	100	100	75	100	100	100	50	83	100	100	89.58	22.79	Good
22	LG12	100	25	25	100	25	100	100	100	100	100	100	100	81.25	33.92	Good
23	LG21	92	100	100	83	75	100	100	100	100	100	100	25	88.89	22.57	Good
24	LG22	75	75	25	100	25	25	100	100	100	100	100	100	77.08	32.78	Good
25	LG31	100	50	25	100	50	75	100	100	100	100	100	50	79.17	27.87	Good
26	LG32	50	0	25	50	0	0	100	100	25	100	0	0	37.50	41.97	Poor
27	LG41	25	0	0	25	0	25	25	25	0	25	25	0	14.58	12.87	Poor
28	LG42	100	100	100	100	0	100	100	100	100	100	100	100	91.67	28.87	Excellent
	Mean													58.75	26.11	Average

No.	Indicators	Priority Weight	Performance index of each indicator: Mojosongo	Musuk	Cepogo	Kota	Banyumanik	Subur	Mekar	Sumber Karya	Getasan	Wahyu Agung	Andini Luhur	Ngudi Luhur	Mean
1	CP11	0.03573640060	1.7868	2.6802	2.6802	1.7868	1.7868	0.8934	3.5736	2.6802	2.6802	2.6802	2.6802	2.6802	2.3824
2	CP12	0.35736400600	17.8682	35.7364	8.9341	35.7364	8.9341	17.8682	35.7364	26.8023	8.9341	26.8023	26.8023	26.8023	23.0798
3	CP21	0.00501587722	0.2508	0.2508	0.1254	0.5016	0.5016	0.1254	0.1254	0.2508	0.3762	0.1254	0.1254	0.1254	0.2403
4	CP22	0.00001052400	0.0005	0.0005	0.0003	0.0011	0.0011	0.0003	0.0003	0.0005	0.0008	0.0005	0.0003	0.0003	0.0005
5	CP23	0.00587329515	0.2937	0.2937	0.2937	0.2937	0.1468	0.1468	0.1468	0.2937	0.2937	0.2937	0.2937	0.2937	0.2570
6	CP24	0.00014568638	0.0073	0.0073	0.0073	0.0073	0.0036	0.0073	0.0146	0.0073	0.0073	0.0073	0.0073	0.0073	0.0076
7	CP25	0.00819161620	0.8192	0.0000	0.0000	0.8192	0.2048	0.4096	0.4096	0.6144	0.8192	0.6144	0.4096	0.8192	0.4949
8	CP26	0.00033146386	0.0331	0.0000	0.0000	0.0331	0.0083	0.0166	0.0331	0.0249	0.0331	0.0249	0.0166	0.0331	0.0214
9	CP31	0.00079011918	0.0790	0.0790	0.0790	0.0790	0.0790	0.0790	0.0790	0.0790	0.0593	0.0790	0.0790	0.0790	0.0774
10	CP41	0.33878001465	16.9390	33.8780	8.4695	25.4085	8.4695	8.4695	16.9390	16.9390	16.9390	0.0000	8.4695	16.9390	14.8216
11	PF11	0.07971709706	1.9929	1.9929	5.9788	1.9929	1.9929	1.9929	1.9929	3.9859	3.9859	5.9788	3.9859	3.9859	3.3215
12	PF12	0.05322452827	2.6612	3.9918	3.9918	2.6612	1.3306	1.3306	1.3306	3.9918	3.9918	3.9918	3.9918	2.6612	2.9939
13	PF21	0.00000000094	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	PF22	0.00001884419	0.0009	0.0009	0.0005	0.0014	0.0009	0.0005	0.0014	0.0009	0.0009	0.0014	0.0005	0.0009	0.0009
15	PF31	0.00011788870	0.0059	0.0029	0.0029	0.0029	0.0000	0.0000	0.0029	0.0059	0.0088	0.0059	0.0059	0.0029	0.0039
16	PF32	0.00003929623	0.0020	0.0010	0.0010	0.0010	0.0029	0.0010	0.0000	0.0020	0.0020	0.0029	0.0010	0.0010	0.0015
17	BP11	0.00089796735	0.0449	0.0000	0.0224	0.0000	0.0673	0.0224	0.0000	0.0673	0.0673	0.0673	0.0224	0.0673	0.0374
18	BP21	0.00905381412	0.4527	0.2263	0.2263	0.2263	0.4527	0.0000	0.0000	0.4527	0.4527	0.9054	0.4527	0.4527	0.3584
19	BP31	0.00000000506	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
20	BP32	0.00000444648	0.0004	0.0004	0.0004	0.0004	0.0001	0.0000	0.0001	0.0004	0.0004	0.0004	0.0002	0.0002	0.0003
21	LG11	0.00333633102	0.3336	0.2502	0.2502	0.3336	0.0834	0.3336	0.2502	0.2502	0.3336	0.3336	0.2502	0.3336	0.2780
22	LG12	0.00000372486	0.0004	0.0004	0.0003	0.0004	0.0001	0.0001	0.0000	0.0003	0.0003	0.0004	0.0004	0.0004	0.0003
23	LG21	0.00000000097	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
24	LG22	0.00000000087	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
25	LG31	0.10134217904	5.0671	2.5336	7.6007	5.0671	7.6007	7.6007	2.5336	7.6007	7.6007	10.1342	5.0671	7.6007	6.3339
26	LG32	0.00000073110	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
27	LG41	0.00000005474	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
28	LG42	0.00000408577	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004
Aggregate value of the performance of relationship			48.6401	81.9269	38.6653	74.9545	31.6678	39.2983	63.1701	64.0506	46.5878	52.0503	52.6623	62.8868	53.97036364
Category			Marginal	Good	Poor	Good	Poor	Poor	Average	Average	Marginal	Average	Average	Average	Average

Table VII.
The performance index of indicators and the aggregate value of the performance of relationship in each surveyed dairy cooperative in Central Java Province

Table VIII.
The performance index of indicators and the aggregate value of the performance of relationship in each surveyed dairy cooperative in West Java Province

			Score of each indicator												
No.	Indicators	Priority Weight	KPSBU	Puspa Mekar	Mitra Jaya Mandiri	KPBS	Sinar Jaya	Sarwa Mukti	Tandangsari	Cikajang	Bayongbong	Saluyu	Karya Nugraha	Koptan Larasati	Mean
1	CP11	0.00424202811240	0.247437	0.247437	0.141387	0.212101	0.212101	0.106051	0.176765	0.106051	0.176765	0.176765	0.141387	0.141387	0.173803
2	CP12	0.00000000052714	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
3	CP21	0.00008222012712	0.002056	0.000000	0.002056	0.008222	0.004111	0.000000	0.002056	0.000000	0.004111	0.004111	0.002056	0.002056	0.002569
4	CP22	0.00000549322664	0.000412	0.000000	0.000137	0.000549	0.000275	0.000000	0.000137	0.000000	0.000275	0.000275	0.000137	0.000137	0.000195
5	CP23	0.00000000072848	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
6	CP24	0.00000000003928	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
7	CP25	0.00000000000008	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
8	CP26	0.00000000000001	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
9	CP31	0.00115521724745	0.115522	0.115522	0.086641	0.096264	0.057761	0.115522	0.115522	0.115522	0.115522	0.115522	0.115522	0.115522	0.106697
10	CP41	0.00907150252679	0.378010	0.226788	0.151222	0.529141	0.226788	0.378010	0.302353	0.453575	0.604797	0.151222	0.529141	0.226788	0.346486
11	PF11	0.00000000258298	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
12	PF12	0.00000000005271	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
13	PF21	0.00000000000019	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
14	PF22	0.00000001201888	0.000001	0.000000	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000000	0.000001	0.000001	0.000001	0.000001
15	PF31	0.00000000034158	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
16	PF32	0.00000148012816	0.000148	0.000000	0.000000	0.000148	0.000000	0.000000	0.000000	0.000000	0.000000	0.000037	0.000074	0.000000	0.000034
17	BP11	0.00000002510941	0.000002	0.000002	0.000001	0.000002	0.000000	0.000001	0.000001	0.000002	0.000002	0.000002	0.000001	0.000002	0.000002
18	BP21	0.00000000028318	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
19	BP31	0.00002373827518	0.001780	0.001978	0.001780	0.002374	0.001780	0.001780	0.002176	0.002374	0.002374	0.001978	0.001780	0.001780	0.001995
20	BP32	0.00000000000815	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
21	LG11	0.00750674256926	0.750674	0.187669	0.750674	0.750674	0.500475	0.750674	0.750674	0.750674	0.625537	0.750674	0.750674	0.750674	0.672479
22	LG12	0.00000000002255	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
23	LG21	0.62617000185320	57.401004	62.617000	62.617000	52.178746	41.746754	62.617000	62.617000	62.617000	62.617000	62.617000	15.654250	62.617000	55.659730
24	LG22	0.00000005109384	0.000004	0.000004	0.000001	0.000005	0.000001	0.000001	0.000005	0.000005	0.000005	0.000005	0.000005	0.000005	0.000004
25	LG31	0.17328713847026	17.328714	8.664357	4.332178	17.328714	8.664357	12.996535	17.328714	17.328714	17.328714	17.328714	17.328714	8.664357	13.718565
26	LG32	0.00000001413978	0.000001	0.000000	0.000000	0.000001	0.000000	0.000000	0.000001	0.000001	0.000000	0.000001	0.000000	0.000000	0.000001
27	LG41	0.00031229066579	0.007807	0.000000	0.000000	0.007807	0.000000	0.007807	0.007807	0.007807	0.000000	0.007807	0.007807	0.000000	0.004554
28	LG42	0.17814203984952	17.814204	17.814204	17.814204	17.814204	0.000000	17.814204	17.814204	17.814204	17.814204	17.814204	17.814204	17.814204	16.329687
	Aggregate value of the performance of relationship		89.874961	*85.897284*	*88.928954*	89.874961	*94.787588*	*99.117417*	*99.195931*	*94.787588*	99.2089306	98.968319	52.345754	90.333913	87.016801
	Category		Excellent	Good	Good	Good	Average	Excellent	Excellent	Excellent	Excellent	Excellent	Average	Excellent	Good

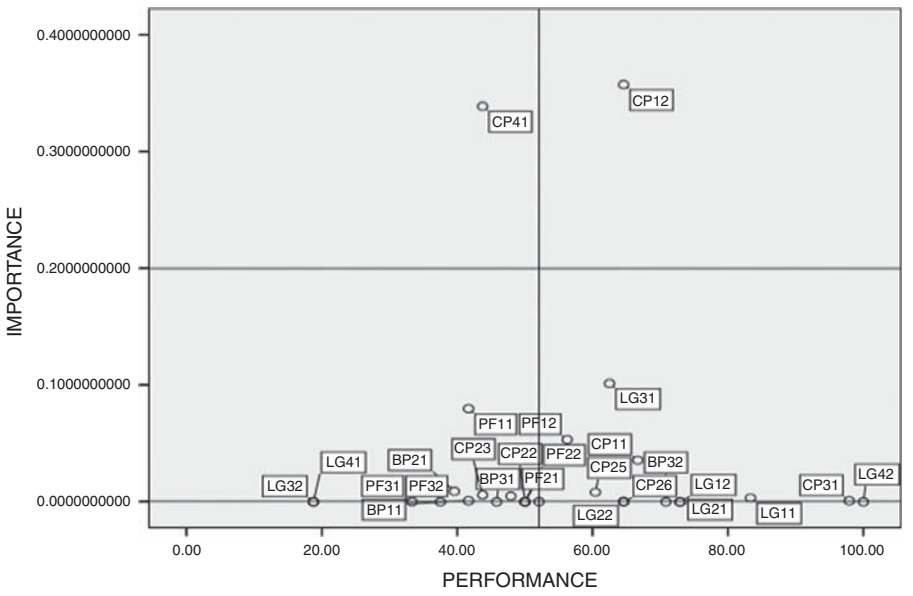

Figure 1.
IPA of the relationship between dairy farmers, cooperative and individual milk processor in Central Java Province, according to the median value for the axis

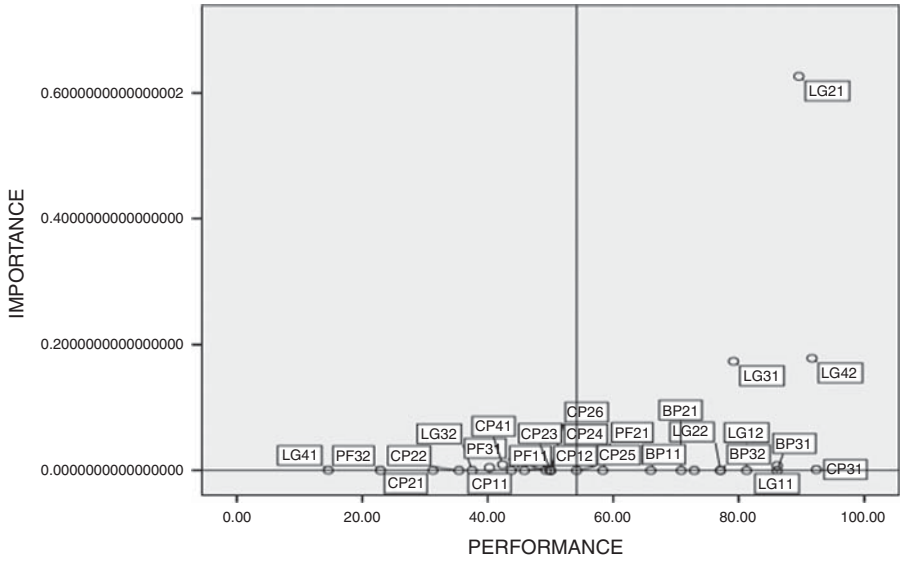

Figure 2.
IPA of the relationship between dairy farmers, cooperative and individual milk processor in West Java Province, according to the median value for the axis

This preference is recommended by Lynch *et al.* (1996) and also Martilla and James (1977). In detail, the condition of the four quadrants in IPA can be explained as follows. "Concentrate here" is a quadrant that has high importance but low performance, so we should pay more attention to the indicators belonging to this quadrant because they indicate the major weakness of the enterprise. "Keep up the good work" is a quadrant of high importance and high performance. We may give some attention to maintain the indicators in

this quadrant because those indicators have opportunities to improve the enterprise's competitive advantage. The indicators in this quadrant indicate the major strength of the enterprise. "Low priority" is a quadrant for indicators with low importance and low performance. The indicators in this quadrant indicate the minor weakness of the enterprise and the enterprise does not need additional effort to improve those indicators. "Possible overkill" is a quadrant that has low importance but high performance. This quadrant indicates that business resources committed to these indicators would be overkill and should be deployed elsewhere (Martilla and James, 1977).

For Central Java (Figure 1), we could not see the indicators included in the quadrant of "concentrate here" because the position of the indicators is very close to each other. However, by comparing the score of the indicator with its median value (52.08) and the priority weight of the indicator with its median value (0.000331464), it can be concluded that there are six indicators included in quadrant "concentrate here", namely, the level of conformity of TPC contained in the milk delivered by the farmers with SNI (CP21), the level of conformity of fat contained in the milk delivered by the farmers with SNI (CP23), percentage of profit sharing received by the farmers from selling their milk to cooperatives (PF11), time span between cooling process in the dairy cooperative and milking process (BP11), the number of types of quality checking of milk conducted by the cooperative before they sent it to the industrial milk processor (BP21) and the level of sophistication of equipment used by the farmers for milking process (LG41). These indicators are the major weakness of the relationships between dairy farmers, cooperatives and industrial milk processor in Central Java Province. On the other hand, the major strength consists of eight indicators belonging to quadrant "keep up the good work," namely, the level of satisfaction of dairy farmers with price offered by the cooperative (CP11), level of satisfaction of cooperatives with the commitment of dairy farmers to produce milk with specific quantity (CP12), the level of conformity of Solid Nonfat (SNF) contained in the milk delivered by the farmers with SNI (CP25), level of conformity of Solid Nonfat (SNF) contained in the milk delivered by the farmers with standard of industrial milk processor (CP26), easiness of the farmers to get in touch with the cooperatives (CP31), percentage of profit sharing received by the cooperatives from selling their milk to industrial milk processors (PF12), the frequency of information sharing between the farmers and cooperatives (LG11) and the frequency of training for capacity building from cooperatives to farmers in a year (LG31).

As for the West Java case (Figure 2), we also could not see the indicators included in the quadrant of "concentrate here" because the position of the indicators that is very close to each other. However, using the same method with that on Central Java above, it can be recognized that there are six indicators in the quadrant of "concentrate here", i.e., level of satisfaction of dairy farmers with price offered by the cooperative (CP11), level of conformity of TPC contained in the milk delivered by the farmers with SNI (CP21), level of conformity of TPC contained in the milk delivered by the cooperatives with the standard of industrial milk processor (CP22), duration of farmers to become a member of cooperatives (CP41), prices per liter that cooperatives get out of industrial milk processor according to the quality of their milk (PF32) and level of sophistication of equipment used by the farmers for milking process (LG41). These indicators are the major weakness of the relationships between dairy farmers, cooperatives, and industrial milk processor in West Java Province. Then, the major strength consists of eight indicators in the quadrant of "keep up the good work", namely, easiness of the farmers to get in touch with the cooperatives (CP31), time span between cooling process in the dairy cooperative and milking process (BP11), level of implementation of HACCP and other quality control measures by the farmers (BP31), frequency of information sharing between the farmers and cooperatives (LG11), level of collaboration in problem-solving between the farmers and cooperatives (LG21), level of collaboration in problem-solving between the cooperatives and industrial processing milk (LG22), frequency of training for capacity building from cooperatives

to farmers in a year (LG31) and level of sophistication of equipment used by cooperative for cooling the milk (LG42).

Comparing the results of IPA analysis in two different regions, it is found out that two indicators, i.e., the level of conformity of TPC content with SNI in milk delivered by the farmers and the level of sophistication of equipment used by the farmers for milking process, are the major weakness in both provinces. The level of TPC is one of the main problems of milk quality received at the dairy cooperative and industrial milk processor. High TPC levels are a concern for industrial milk processors as it impacts the usage of the milk. To address the milk quality issue, the industrial milk processor has a campaign by its farm advisors with training on hygiene practices; replacing plastic buckets with metal ones; and installing some milk cooling units (Morey, 2011). Moreover, the major weakness in Central Java Province lies in the different perspectives (no perspective is dominant), whereas that in West Java Province is dominated by the perspective of the customer.

The indicator of easiness of the farmers to get in touch with the cooperatives (CP31) and frequency of training for capacity building from dairy cooperatives to farmers become the main strength in both provinces. It is because the cooperative has the important role for the dairy farmers. Dairy cooperatives were introduced by the government to link milk producers with milk processors and to provide farmers with services and inputs. The cooperative's role is like a buffer between the dairy farmers and the dairy processing industry. The cooperative is an organization with the main purpose to improve the farmers' welfare (Sebayang, 2013; Susanty *et al.*, 2017). The major strength of the relationships between dairy farmers, cooperatives and industrial milk processors in Central Java is dominated by the perspective of the customer, while that in West Java is dominated by the perspective of learning and growth.

Strategic planning with SWOT analysis

SWOT analysis is one of the most popular tools for strategic planning (Lu, 2010). In this research, SWOT analysis is used to formulate strategic planning in dairy milk supply chain, specifically, to enhance the performance of the relationship between dairy farmers, cooperatives and industrial milk processors. SWOT is an acronym for strengths, weaknesses, opportunities and threats. It has its origins in the 1960s (Learned *et al.*, 1965), and was popularized by Weihrich's (1982) work. The outcome of the analysis is in terms of suggestions insights regarding the trajectory of the organization categorized in "strengths" that should be sustained (i.e. inner potential), "weaknesses" that must be overcome (i.e. inner barriers), "opportunities" that have to be sought (i.e. environmental prospects), and "threats" that ought to be alleviated (i.e. environmental hindrances) (Hovardas, 2015).

The data for the analysis came from two different sources. The first is with regards to strengths and weaknesses, i.e., the results of assessing the condition of the internal relationship between dairy farmers, cooperatives and milk processors through the IPA. As explained in the previous section, in Central Java Province, there were eight indicators belonging to the major strength and six indicators belonging to the major weakness, while in West Java Province, there were eight and six indicators belong to mayor weakness. Then, the source of data for the second factor of SWOT (opportunities and threats) is the result of the interview with the representatives of management of dairy cooperatives being sampled in this research and also the policy and regulation from the government which is related with the dairy industry. There are three opportunities. First, the growth in demand in dairy products as an impact of "Fresh Milk Campaign." In this campaign, the government gives subsidies and free milk to primary students (Ditjennak, 2011). The government also cooperates with dairy firms in promoting the health benefits of fresh milk. The government aims to double the consumption of milk by 2024. June 1 was declared as the National Milk day by the Ministry of Agriculture in 2009 (Ministry of Agriculture Decree No. 2182/KPTS/

PD.420/5/2009) (Vanzetti *et al.*, 2016). Demand in fresh milk also increases in order to fulfill the raw material needed by industrial milk processor. Currently, more than 80 percent of raw material needed by industrial milk processors should be imported from the other countries. Second, credit facility for funding is being endorsed by the Government. By Presidential Instruction Number 6/2007, the government introduced a credit scheme for micro and small enterprises, known as microcredit loans (KUR-Kredit Usaha Rakyat). These are government-guaranteed loans directed to micro, small and medium enterprises as well as cooperatives, which are productive and feasible businesses, but still un-bankable. The KUR scheme initially requires a project or business activity as the principal collateral for the loan. However, since this collateral does not meet with the banks' own requirements, the government initiated a guarantee program for micro, SMEs and cooperatives so they can access loans from banks. KUR is intended to provide working capital and investment credit of up to Rp500m. The credit providers are commercial banks assigned by the government (Machmud and Huda, 2011). Third, Government Regulation No. 6/2013 concerning the empowerment of the farmers. Empowerment of farmers is all efforts made by the government, provincial government, district/city government and stakeholders in the field of animal husbandry and health to enhance independence, facilitate and improve the business, competitiveness and welfare of farmers. Then, the main threat faced by dairy industry is related to the free market of dairy commodity and import of raw milk. One aspect of pillar number one in the ASEAN economic community (AEC) which was effectively implemented by the end of 2015 is free flow of goods. Within this pillar, the tariff will be reduced or eliminated to increase the value of inter and extra-ASEAN trade in the agricultural, including dairy sector (Priyanti and Soedjana, 2015). Then, the regulation of the Minister of Finance No. 145/PMK.011/2008 concerning fiscal incentives in the form of government-borne duties on the import of goods and materials used in the dairy processing industry has caused industrial milk processor free to import milk. The regulation of the Minister of Finance No. 19/PMK.011/2009 regarding the determination of import duty rated on specific milk products from five percent to zero percent has made the industrial milk processors more powerful to determine the price of milk.

So, based on the major strength and weakness in the current relationships between dairy farmers, cooperatives, and industrial milk processors, and also the opportunity and threat faced by the dairy milk industry, the strategic planning for each province can be seen in Tables IX and X.

5. Discussion

Using the balanced supply chain management scorecard, IPA analysis and SWOT analysis, this research has three purposes. First, this study aims to measure the current performance of the relationships between farmers, dairy cooperatives and industrial milk processors. The second one is to identify the indicators that are most in need of improvement, and the third is to formulate some strategic plans. In the case of the two provinces, the results of the balanced supply chain management scorecard combined with the IPA analysis show that the performance of the relationships between farmers, dairy cooperatives and industrial milk processors in West Java Province is slightly better than that in Central Java. It can be seen from the average value of the score of indicator, the category of each indicator and the category of the performance index of each relationship. The average value of the score of the indicator in West Java Province is slightly larger than that in Central Java. Also, the percentage of indicators belonging to the category of average, good and excellent in West Java is slightly larger than that in Central Java. Almost all of the performance indices of the relationships between dairy farmers, cooperatives and industrial milk processors in West Java are included in the category of average and good, whereas, in Central Java, only half of the performance indices are in the category of average and good.

	Strength	Weakness
	Most of dairy farmers have been satisfied with price offered by the cooperative Most of dairy cooperatives have been satisfied with the commitment of dairy farmers to produce milk with specific quantity High level of conformity of SNF content with SNI in milk delivered by the farmers Most of the farmer feel easy to get in touch with the cooperatives High percentage of profit sharing received by the cooperatives from selling their milk to industrial milk processors High frequency of information sharing between the farmers and cooperatives Training is often carried out by dairy cooperative to increase the capacity of the farmers	Low level of conformity of TPC content with SNI in milk delivered by the farmers Low level of conformity of fat content with SNI in milk delivered by the farmers Low percentage of profit sharing received by the farmers from selling their milk to cooperatives Time span between cooling process in the dairy cooperative and milking process is too long Types of quality checking of milk conducted by the cooperative is very limited Most of dairy farmer still use their hand for milking process
Opportunity: Growth in demand in dairy product, including fresh milk as the impact of "Fresh Milk Campaign" The availability of credit from government for micro, SMEs, and cooperatives, so they can access loans from banks. to provide working capital and investment credit Government Regulation No .6/2013 concerning empowerment of farmer	Utilize the feeling of satisfaction of dairy farmers with price offered by the cooperative and also commitment dairy farmers to produce milk with specific quantity as a trigger to encourage the dairy farmer to produce more quality milk Utilize the easy contact between farmers and cooperatives to discuss and make KUR loan proposals to banks Utilize the easy contact between farmers and cooperatives to discuss the type of assistance needed and make the proposals	Encourage the cooperatives to conduct comprehensive analysis in determining the most optimal route for milk collection from the farmers, so time span between milking process and storage in cooling units in the cooperatives can be shortened Encourage the cooperative to utilize the credit facility from government to purchase more vehicles for milk collection and also equipment needed for milk quality testing Encourage the farmer to utilize the credit facility from government to purchase high quality of fodder and milking machine. Using milking machine will reduce the contact between milk with the farmer, resulting in more cleaner and hygienist milk Encourage the dairy farmers and cooperative to utilize the aid from government to enhance their capacity in produce high-quality milk
Threat: Free flow of dairy product from ASEAN countries as impact of AEC The regulation of the Minister of Finance No. 145/PMK.011/2008 has caused industrial milk processor free to import milk Regulation of the Minister of Finance No. 19/PMK.011/2009 has caused the industrial milk processors power to determine the price of milk	Utilizing training as a means for educating the farmer in producing high quantity and quality of milk so the milk produced by the dairy farmer not only can meet the demands of industrial milk processor but also can be exported to the ASEAN countries	

Table IX.
Strategic planning for increasing the performance of the relationship between dairy farmers, cooperatives, and industrial milk processor in Central Java Province

	Strength	Weakness
	Most of the farmer feel easy to get in touch with the cooperatives Short duration time between milking process and stored in cooling unit in cooperative High level of implementation of HACCP and other quality control measures by the farmers High frequency of information sharing between the farmers and cooperatives High level of collaboration in problem-solving between the farmers and cooperatives High level of collaboration in problem-solving between the cooperatives and industrial processing milk Training is often carried out by dairy cooperative to increase the capacity of the farmers High level of sophistication of equipment used by cooperative for cooling the milk (LG42)	Low level of satisfaction of dairy farmers with price offered by the cooperative Low level of conformity of TPC content with SNI in milk delivered by the farmers Low level of conformity of TPC content with SNI in milk delivered by the cooperatives to industrial milk processor Loyalty of the farmers to dairy cooperatives still low; it can be seen from the duration of farmers become a member of cooperatives Low prices per liter that cooperatives get from of industrial milk processor according to the quality of their milk Most of dairy farmer still use their hand for milking process
Opportunity: Growth in demand in dairy product, including fresh milk as the impact of "Fresh Milk Campaign" The availability credit for micro, SMEs and cooperatives, so they can access loans from banks. to provide working capital and investment credit Government Regulation No. 6/2013 concerning empowerment of farmer	Utilize information sharing and the collaboration between dairy farmers, cooperative and industrial processing to discuss and solve the problems of production techniques faced by farmers, so they can produce more quality milk Improve the implementation of HACCP and other quality control by utilizing the credit facility and government aid Improve the level of satisfaction of equipment used by cooperative for cooling the milk by utilizing credit facility from government	Encourage the cooperatives to conduct comprehensive analysis in determining the relationship between price and the quality of milk offered by the farmers Utilize the promise from government to empower the dairy farmers as a tool to make an agreement with the industrial processing related with milk price Encourage the farmer to utilize the credit facility from government to purchase milking machine so they can produce more hygienist milk
Threat: Free flow of dairy product from ASEAN countries as impact of AEC The regulation of the Minister of Finance No. 145/PMK.011/2008 has caused industrial milk processor free to import milk Regulation of the Minister of Finance No. 19/PMK.011/2009 has caused the industrial milk processors power to determine the price of milk	Utilizing training as a means for educating the farmer in producing high quantity and quality of milk so the milk produced by the dairy farmer not only can meet the demands of industrial milk processor but also can be exported to the ASEAN countries Improve the implementation of HACCP and other quality control measures by the farmer and also the level of satisfaction of equipment used by cooperative for cooling the milk to produce the quality milk that meet the standard of industrial processing milk and also standard of ASEAN countries	

Table X.
Strategic planning for increasing the performance of the relationship between dairy farmers, cooperatives and industrial milk processor in West Java Province

There have been several conditions that make the performance in West Java better than that in Central Java. A major milk processor in West Java has worked with its dairy cooperative to install milk cooling units to improve the quality of milk received. This good action attracted all the dairy cooperatives in West Java to have milk cooling units. There is penalty received by the dairy cooperative if milk received by the industrial processor has a temperature of more than eight Celsius degrees. Besides, The Provincial Government of West Java has received a grant from the Central Government to install milk cooling units at the cooperatives. They installed three units in 2010 and four units in 2011. This measure assisted to reduce the TPC by cooling milk more quickly when received from the farmers. Then, related to improving the capacity of cooperatives and dairy farmers, West Java Province has Cikole Dairy Training Center. This center is funded by the Japan International Corporation Agency and aimed at providing technology transfer to improve dairy farming and milk production (Morey, 2011). To get long-term profitability, some cooperatives in West Java (such as KPBSU Lembang) have engaged in dairy processing activities as they are aware that much of the value added is created in the chain function (Susanty *et al.*, 2017).

This research has some implications for the dairy cooperative. It provides some insights for the management of the dairy cooperative in the context of strategic planning. The research reveals that there is a difference in strategic planning for improving the performance of the relationships between dairy farmers, cooperatives, and industrial milk processors between the two provinces. The management in Central Java should pay more attention to the transport of milk from dairy farmers to cooperatives through comprehensive analysis in determining the most optimal route for milk collection and also add more vehicles for the purpose and encourage dairy farmers to utilize the credit facility from the government to purchase high-quality fodder. Besides, it is important for the management of dairy cooperative to maintain the satisfaction of dairy farmers to the cooperative and the ease of contact already established as a means to discuss and make a proposal for getting the credit or assistance from the government. So, the assistance will meet the needs of the farmers.

Meanwhile, the management of the dairy cooperative in West Java should pay attention to the relationship between price and the quality of milk offered by the farmers and make a fair agreement with the industrial milk processor in determining the price. It is also important for management to give real support to improve the implementation of HACCP and other quality control conducted by the farmers and the level of satisfaction of equipment for cooling the milk through utilizing the credit facility from the government. Both of the management in Central Java and West Java Provinces should pay more attention to encourage the farmers to use milking machine in the process so they can deliver high-quality milk, which, in turn, can make the cooperative deliver the high-quality milk to the industrial milk processor. To win the free flow of dairy product in ASEAN countries, it is important for the dairy cooperative in both provinces to utilize training as a means for educating the farmers to produce high-quality milk This way, not only can the milk meet the SNI but can be exported to other ASEAN countries as well because the milk meets the ASEAN standard.

6. Limitations and future research directions

This study has several limitations. First, not all the dairy cooperatives in Central Java and West Java have become the sample; instead, it was only 24 of them. Although the sample represents 80 percent of the milk produced from Central Java and West Java, the limited sample of this research can make the results still bias due to the condition of the surveyed dairy cooperatives. Second, this study used the Likert scale as an approach for measuring the performance of each indicator in the context of the focus of study, which can be the source of bias as well, especially in expressing the level of current performance of the relationships.

In response to this limitation, suggested future research may lie in trying to add the sample size with the remaining dairy cooperatives in both provinces, and also to replicate this study by surveying the dairy cooperatives in other provinces such as East Java (the other province that produces the largest milk in Indonesia). Future research may also enhance the measurement of the performance of the relationships between farmers, dairy cooperatives and industrial milk processors by using a direct measurement of each indicator in each perspective, rather than relying on the cooperative management's perceptions.

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