



SUPPLIER QUALITY PERFORMANCE IMPROVEMENT IN A
FROZEN FOOD BUSINESS

By
NAPAPORN SREKAMNERD

A Final Report of the Six-Credit Course
SCM 2202 Graduate Project

Submitted in Partial Fulfillment of the Requirements for the Degree of
MASTER OF SCIENCE IN SUPPLY CHAIN MANAGEMENT

Martin de Tours School of Management
Assumption University
Bangkok, Thailand

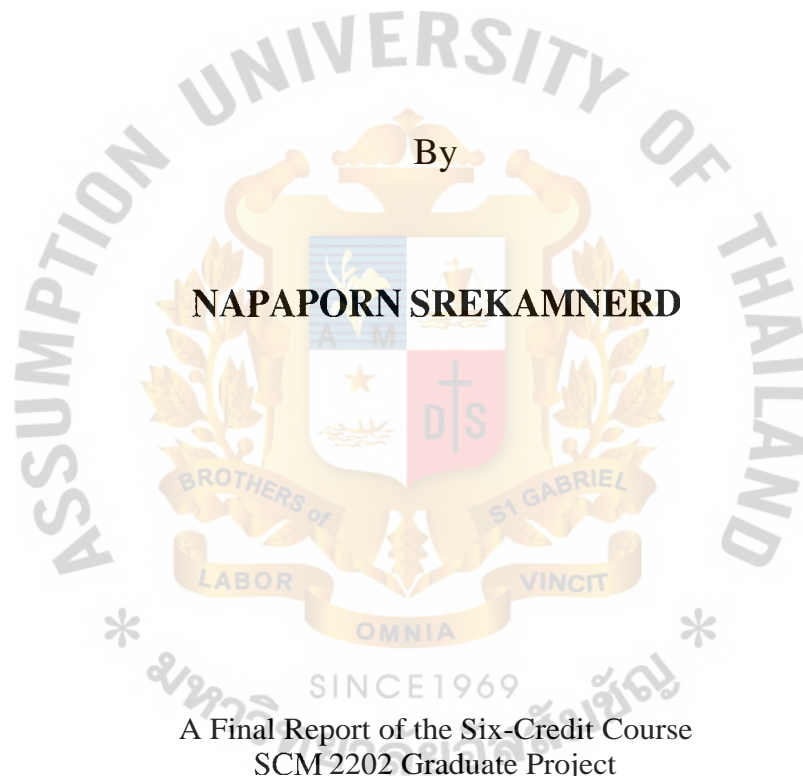
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ABSTRACT

The study is aimed at solving the problems of product quality from suppliers for improving the quality performance of a frozen food business named “CGT” and suppliers. The study designs a quality control process by adding the random inspection process and requires the suppliers attach the quality report which covers all the three testing results with products in all shipments. This is to develop the quality control process of the second tier suppliers to random check the quality problems of all products before delivered to CGT.

The findings indicate that there are three main quality problems: 1) contamination of foreign materials; 2) non conforming to specification in over/ under specification; and 3) over defective standard. In order to solve the quality problems, the designing of quality control process for enhancing the performance of suppliers to the standard level is suggested.

The expected result after implementing the new quality control process can be illustrated. The total sales of the year 2013 are increased to 6.19 million THB which is equal to the rejected amount of the products. This indicates the effectiveness and efficiency of the program.

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CHAPTER I

GENERALITIES OF THE STUDY

Suppliers have created significant competitive advantages in the strategic roles and have a positive or a negative performance that impacts on the overall organization's performance. Many companies have faced the problems that those suppliers are unable to improve themselves (Krause, Scannell & Calantane, 2000). Previous research studies suggested the supplier's performance improvement strategies. Supplier's development program and improvement rewards are represented to improve a performance of supplier (Monczka, Trent & Callahan, 1993). Organizations are implementing supplier's development to maintain a higher performance or joint problem solving with supplier network.

1.1 Background of the Research

The CGT Company in this case study is doing trading business for frozen food products in the category of frozen vegetables and fruits which are the fast moving consumer goods (FMCG) that serve the customer group of modern trade, quick service restaurant (QSR), food factories, retail stores and general restaurants in Thailand. These frozen vegetables and fruits are imported from the China mainland port and arrived to the Bangkok port by sea freight. In the part of product sourcing, the company sources the products by connecting the trading agents in China. There are 3 suppliers which are partnerships that have a long term relationship and a long term contract with the company. These frozen vegetables and fruits are purchased from suppliers for fulfilling customer's orders. The company has inventory management services for keeping and planning stocks as customer's forecast.

The Company faces the poor quality performance of suppliers as shown on customers' complaints which are reported by the Quality Control Department, responsible for inspecting all the products that are arrived to a warehouse and taking

care of customers' complaints and rejection due to poor product quality. Table 1.1 indicates the total sales amount and rate of product rejection in the year 2012.

Table 1.1 The Total Sales Amount and Rate of Product Rejection in 2012

Month	Total Sales Amount (THB)	Product Rejection (THB)	% of Product Rejection
Jan.	9,114,773.76	-	-
Feb.	10,036,373.20	715,000.28	7.12%
Mar.	11,027,524.00	452,418.00	4.10%
Apr.	10,479,311.20	-	-
May	11,960,515.40	668,200.00	5.58%
Jun.	12,584,782.20	702,185.62	5.57%
Jul.	12,037,410.95	1,015,862.48	8.43%
Aug.	12,320,916.30	642,181.00	5.21%
Sep.	11,131,178.00	-	-
Oct.	13,686,476.00	500,131.00	3.65%
Nov.	13,854,494.50	801,192.00	5.78%
Dec.	14,957,919.50	700,126.18	4.68%
Total	133,155,301.81	6,197,296.56	4.65 %

Source: The Company's data

Table 1.1 shows that the product rejection from customers was **6,197,296.56 THB** in 2012 which was about **4.65 %**.

Certainly, the poor quality performance of suppliers has the negative impact on organization's performance which not only lost a sale revenue, but also effects a poor reputation, a loss of opportunities, customer loyalty and creditability.

This research is expected to propose the supplier performance improvement in part of the quality area which develops partnership performance of the partnership in 3 suppliers from China for assessing supplier relationship and enhances organization performance.

1.2 Statement of the Problem

Figure 1.1 presents the roadmap for the statement of the problem of the CGT Company as followed:

Figure 1.1 The roadmap for statement of problem of the CGT Company



Source: Author

Regarding the quality problems of products from suppliers reported by product inspection record from the quality control department, the defects and poor product quality from Chinese suppliers are continuously increasing. The historical data of some shipment must be rejected to the suppliers; as a result, the shortage of products is effected. The company cannot serve the customer on time delivery.

Moreover, the company also receives the customer complaints about poor product quality, shortage stock and late delivery. From this poor performance of the company, the customers do not only reject some core products with quality problems but it also makes customers unsatisfied with contract extension. The company recognizes that the impact of poor performance is related to the supplier performances which cause the loss of sale revenue, poor reputation, and loss of opportunities. However, when things go wrong, the company desires to maintain the ongoing relationship for a long term and try to solve the problems because the exiting suppliers are usually willing to

cooperate and support at all time. Therefore, the company is concerned about the supplier development and buyer-supplier commitment to improve the performance of the supplier. Thus, this research focuses on the supplier quality performance improvement, considering **"how to apply the supplier development program to enhance the performance of suppliers"**.

1.3 Research Objectives

1. To assess the root cause of the quality problems.
2. To identify the relevant quality criteria of the supplier performance improvement.
3. To design the supplier development program in order to enhance the performance of the supplier to the standard level.

1.4 Scope of the Research

This research focuses on the supplier performance improvement for developing the current supplier quality performance. The development of the quality control program and the relationship of buyer-supplier are concerned so other performance criteria such as delivery, cost and so on will not be included in this study.

1.5 Significance of the Research

The company would be able to improve the exiting supplier performance of the exiting suppliers concentrating on the quality criteria by designing the supplier development program. The result of this study will be used to improve the organization's performance which could be solved the quality of poor products and maintain a long term relationship with suppliers. The research also aims to enhance the performance of suppliers to the standard level which are beneficial for good performance to both parties.

1.6 Limitations of the Research

This research focuses on the improvement of the supplier quality performance in terms of the main food product categories of frozen vegetables and fruits. The result of this research can be applied to only this company and cannot be generalized to other contexts or businesses; the current study is generated from the concepts of supplier's development which are merely used for solving the poor quality performance of a particular company. The result of the supplier development program may be limited and the cost of the product rejection does not include other costs of poor product quality such as re-inspection cost, recalled product cost, transportation cost and inventory holding cost.

1.7 Definition of Terms

Food Safety Management Systems	The control of the potential food safety hazards that associates with a product ensures compliance with food safety legislation, retailer's standard and / or private quality assurance (Manning, Baines & Chadd, 2006)
Foreign Material	Defined as material quantity that is presented within a food product unanticipated by a customer purchasing the product and a regulatory body that has jurisdiction over the processing and distribution of the product (Peariso, 2005)
Non – Conforming Product	A product not conforming to requirements of customers and organizations and applied to non-conforming processes and services which may

relate to suppliers and outsourced work,
organization activities or the product shipped to
customers
(ISO 9001 Training, 2012)

Supplier Development

The number of qualified suppliers and their
improvement of performance which is increased by
manufactures
(Leenders, 1966)

Supplier Quality Management (SQM) A source for an imbalance proportion of the input
into organization's products, processes and services
which influences on customers' satisfaction and
making quality of a supplier essential to longer term
market success
(Trent & Monczka , 1999)

CHAPTER II

REVIEW OF RELATED LITERATURE

This chapter reviews related literature with the definition of supplier performance improvement, supplier quality management, supplier development and buyer-supplier commitment. The chapter ends with decision quality criteria for assessing the supplier quality performance.

2.1 Supplier Performance Improvement

Wheaton (2009) stated that supplier performance management is more than simply obtaining data on suppliers. It reflects the company's strategy and is a comprehensive approach to managing a company's supply base. It seeks to identify and mitigate risks in an attempt to boost overall profitability. It often involves performance assessments, supplier scorecards, periodic reviews of supplier data, and supplier development. It also includes an orientation that is geared toward improving the performance of the supply base and buying well. Supplier performance management also involves software, systems processes, and people. Effective supplier performance management is not easy to achieve and takes knowledge of an organization's goals, business processes, structure, and supply base. When it is done well, it can bring significant monetary benefits to a company.

All organizations must quantify and manage their risks effectively in order to be successful over time. When dealing with suppliers, there are substantial risks and potential for disasters in the form of bankruptcy, environmental problems, delivery failures, and lacks of materials, poor performance or product defects. Most organizations recognize that these risks exist, but do not take sufficient steps to manage them effectively. While it is true that the risk level cannot be reduced to zero and all disasters cannot be prevented, there are still many steps and organizations can mitigate these supplier risks. One important and cost effective step is to monitor and

manage the performance of suppliers periodically. This article will provide an overview of ways that companies can reduce their risks and leverage additional value by effectively managing the performance of their supply base.

Regarding the continuous improvement of supplier performance, Joshi (2009) indicated the benefits of establishing long-term relationships with suppliers have been extensively examined and widely endorsed in prior literature on manufacturer—supplier relationships increasingly, however, there is evidence that these long-term relationships have a potential "dark side" which is manifested in the form of reduced levels of supplier performance improvement. In this research, Joshi sheds light on two key mechanisms of collaborative communication and control that manufacturers can and do use to curb the dark side potential, ensuring that they continue to reap the benefits of establishing long-term relationships with their suppliers. The study is designed to address two key questions: (1) How does collaborative communication in the manufacturer supplier relationship foster continuous supplier performance improvement?; and (2) What are the combined effects of collaborative communication and control on the outcome? The results show that collaborative communication enhances continuous supplier performance improvement by (1) enhancing supplier knowledge of manufacturer's expectations and giving the supplier clear performance targets at any point of time, and (2) enhancing the supplier's affective commitment toward the manufacturer and making the supplier be motivated to take the actions necessary to grow and evolve the supplier relationship.

2.2 Supplier Quality Management

Many case studies have addressed the supplier performance affected to purchasing units in environment and customer expectations. Shin, Collier and Wilson (2000) discussed that supplier quality management (SQM) can improve the competitiveness of an organization of a demand side by shortening the process cycle of quality performance , minimizing operation cost and customer satisfaction. The aims of "Supplier Quality Management" are to enhance the quality performance in the supply side. Flynn, Schroeder and Sakakibara (1994) stated that the efforts involved quality

in purchasing policies, providing assistance to suppliers, product development process and a long term relationship of suppliers.

Shin, Collier and Wilson (2000) explained that the impact of supplier quality management could reduce operational cost by improving the quality and delivery performance of an organization. Lo, Sculli and Yeung (2006) indicated that the case study of Hong Kong manufacture can improve the quality performance by developing supplier quality management practices which enhance both buyers and suppliers through effective communication and make the relationship of mutual trust in environment (Ellram, 1990).

Forker (1999) stated that the area of quality management reflects the quality performance of organization which is resulted from supplier quality performance.

Thompson (1996) defined the role of supplier quality management that it is to evaluate and select a supplier by considering its quality management practice. A variety of dimensions for measuring supplier quality consist of six principles as follows:

1. Conformance
2. Serviceability
3. Reliability
4. Durability
5. Performance
6. Source credibility

Shadur (1995) explained that the quality management is organized by a standard base rather than a cultural ingrained perspective.

The study by Metric Stream Group stated that the supplier quality management is associated with business sectors ensuring compliance that products or organizations

consist of four main sectors to be considered; quality control, quality planning, quality assurance and quality improvement.

Benefits of a supplier quality management solution from the study of Sparta Systems (2012) could be summarized as follows:

- 1) Ensuring compliance with the ISO standard and the government expectation
- 2) Reducing costs of supplier evaluation driven by multiple redundancy
- 3) Reducing risks of products and other quality problems by ensuring supplier non-conformance.
- 4) Increasing supplier selection efficiency by using a standardized, centralized supplier evaluation process.
- 5) Reducing the risk of lost or incomplete data through a close loop supplier process.
- 6) Increasing accountability through assignments, process step sign offs and automated audits.

2.3 Supplier Development

Modi and Mabert (2007) stated that organizations increase supplier development programs to improve the performance of their suppliers and create competitive advantages. Krause and Ellram (1997) explained that the definition of supplier development is defined as the buying firm's effort that is to increase the capabilities and performance of the supplier to meet the buying firm's objectives in short and / or a long term supply. There are strategies that represent activities of supplier development which encourage supplier performance improvement. These strategies consist of supplier evaluation and supplier incentives.

- 1) Supplier Evaluation: Modi and Mabert (2007) defined the strategy that evaluate and give feedback for supplier improvement and ensure that

suppliers should have perceptions for motivating to improve their performance.

- 2) Supplier Incentives: Krause and Ellram (1997) stated that this strategy encourages suppliers to improve their performance. The buying firm provides incentives to suppliers who need priority consideration and increase volumes in future businesses. The company recognizes good performance of suppliers shown on a certificate.

Krause and Ellram (1997) summarized the activities of supplier development as follows:

1. Supplier Certification
2. Promise of future benefits
3. Supplier plant visits
4. Evaluation of performance
5. Collaboration in the improvement of products and development of new products with suppliers.

2.4 Buyer-Supplier Commitment

Anderson and Weitz (1992) defined buyer – supplier commitment as stable relationship development. Business partners are more willing to maintain a long term relationship. Prakinski and Fan (2007) pointed out that a supplier considers a long term partnership with a loyal buying firm. Therefore, it is the most important for a supplier to consider and work with the commitment as a buying firm's objective. A buyer and a supplier work together to improve quality and reliability and to reduce cost of products which are committed to continuous improvement.

Cannon and Perreault (1999) stated that information sharing may be useful for a buyer and a supplier including supply forecast, sharing of demand forecast, joint planning, technical information, intensive information of cost and quality levels which

acts as the buyer and supplier relationship creating cooperation between a buyer and a supplier.

Campbell (1997) remarked that joint problem solving is an important role for a partnership to develop a relationship and improve performance. Managing relationship has a positive impact on organization's performance which is reflected to overall product quality (Kannan & Tan, 2006).

Krause, Handfield and Tyler (2007) explained that the commitment of both parties is important for establishing a performance goal and provide benefits to an organization. Therefore, buyer-supplier commitment has a critical role of improving supplier performance.

2.5 Decision Quality Criteria for assessing the Supplier Quality Performance

The quality problems of frozen vegetable and fruit products of suppliers are related to foreign material problems, the non-conforming products and the over defective standard. The quality criteria have to associate with food safety management which is designed to control the food safety hazards relating to food products and also to ensure compliance with food safety legislation (Manning, Baines & Chadd, 2006). The main criteria and sub-criteria could be summarized as follows:

Criteria 1: Shipment Quality

- 1) Supplier certification related to food safety regulation
- 2) Rejection of incoming quality control which is the defective incoming material detected by the incoming quality control
- 3) Defective acceptance which is the defective material which can be tolerated to final products

Criteria 2: Quality System

- 1) Comprehensive internal quality audit system in place
- 2) Established document quality system
- 3) Role of the quality function in supplier manufactory

Criteria 3: Quality Planning

- 1) Compliance with company specifications
- 2) Prototype control
- 3) Traceability

Criteria 4: Product Conformance

- 1) Supplier purchases conformed to specification.
- 2) Suppliers with adequate records of inspection and a reliability test
- 3) Use of statistical techniques and process controls daily

2.6 Summary

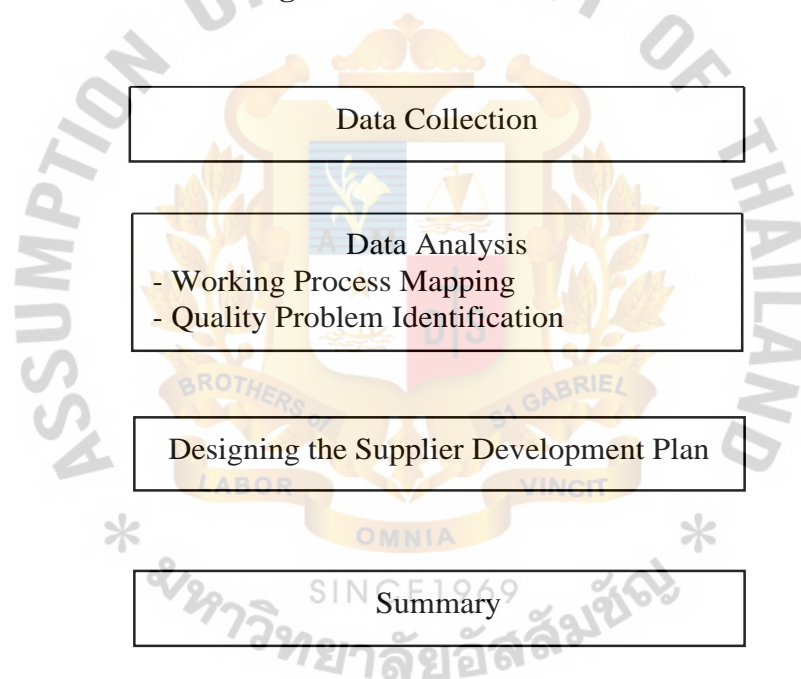
This chapter has explained the literature reviews which include the definition of supplier performance improvement, supplier quality management, supplier development and buyer-supplier commitment. The decision quality criteria for assessing the supplier quality performance are linked to food safety management. These literature reviews also focuses on supplier quality performance improvement. This has become the reason why many organizations' objectives improve effective performance of maintaining supplier performance.

CHAPTER III

RESEARCH METHODOLOGY

This chapter describes the research process that consists of data collection, data analysis, designing the supplier development plan and summary. The research will be conducting based on the following stages:

Figure 3.1 Research Process



Source: Author

3.1 Required Data and Data Collection

The required data for mapping the supplier performance in part of quality criteria can be collected from multifunctional departments; sale records of the year 2012 from the Business Development Department, a purchasing process from the Purchasing Department, historical data of a product inspection report from the Quality Control Department and customer complaint records from the Customer Service Department

are used to identify and analyze for assessing the supplier performance which are summarized and illustrated in Table 3.1 below:

Table 3.1 Required Data and Data Collection

Data	Details	Source of data	Data Collection Technique
Sales Records of the year 2012	Major product items sold in the year 2012	Business Development Department	Documentary review
Purchasing Process	Procurement Process Flow Chart	Purchasing Department	Documentary review and interview
Product Inspection Report of each shipment of the year 2012	Summary of Product Quality Problem records and Product Rejection records of each suppliers in Year 2012	Quality Control Department	Documentary review
Customer Complaint records of the year 2012	Summary of Customer Complaint caused by Product Quality Problems and Customer's rejection records	Customer Service Department	Documentary review

Source: Author

3.2 Data Analysis

The data analysis can be categorized into two parts: 1) the working process mapping; and 2) the quality problems of suppliers.

3.2.1 Working Process Mapping

The working process intends to identify the current procurement process flow for assessing the root cause of poor quality performance of suppliers from the initial process until the end process. The multifunctional participation will need to be involved. However, it cannot be analyzed within just one department as it requires supports from a cross-functional management team; a managing director, a business development manager, a finance manager, a quality control manager and a purchasing manager for defining, developing and implementing the process. The working process starts with creating the business case, including how to link goals and strategies to the supplier performance improvement process and determining supplier performance expectation and criteria aligned with the company goals. Good internal communications which can work with their suppliers and time are involved. Furthermore, the implementation of supplier development plan will be mapped in the supplier performance improvement for designing the supplier development program.

3.2.2 Quality Problems

Referring to the quality problems of frozen vegetables and fruits, the three complaints are recorded in the inspection report by the Quality Control Department:

- 1) Contamination of foreign materials
- 2) Over / Under specification (non-conforming product specification)
- 3) Over defective standard

Some current product quality problems are presented in Table 3.2; the details of quality problems of the ten products are shown below:

Table 3.2 The Current Products Quality Problems

No.	Products	Details of the Problem	Quality Problems
1.	Soybean LBS.	Found spot, discoloration, broken pieces (std $\leq 5\%$) detected 6.93% and found thickness more than 7 mm (std $\geq 90\%$) detected as std 70%	Over Defective Standard and Over Specification
2.	Soybean Half Kernel	Found insect, soybean peel and grass (std not detected = 0%)	Contaminated with the foreign Material
3.	Spinach Ball	Found insects, glass, stake, stem and plastic rope (std not detected= 0%)	Contaminated with the foreign Material
4.	Spinach Cut	Found plastic pieces and scraps of rope (std not detected = 0%)	Contaminated with the foreign Material
5.	Bamboo Shoot Strip	Size (std W X H X L = 2 -5 X 2 – 5 X 20– 50 mm $\geq 70\%$) detected 39.55%	Under Specification
6.	Green Pea	Found discolor and yellow pea (std $\leq 5\%$) detected 5.28%	Over Defective Standard
7.	Kiwi Sliced	Found thickness less than 7.0 – 12.0 mm (std $\geq 90\%$) detected as std. 63.63%	Under Specification
8.	Lotus Root	Found dia. less than 40-55 mm and have thickness less than 8-10 mm (std $\geq 90\%$) detected as std 80.01% and found broken pieces (std $\leq 5\%$) detected 6.25%	Under Specification and Over Defective Standard
9.	Sweet Corn Kernel	Found damage kernel, crushed, ragged, loose skin, broken, and black seed (std $\leq 5\%$) detected 6.38%	Over Defective Standard
10.	Strawberry	Found worms (std. not detected = 0%) And found damage(<1/3 whole pieces) (std $\leq 5\%$) detected 5.7%	Contaminated with the foreign Material and Over Defective Standard

Source: Quality Control Department

As the quality complaints are illustrated, correctives and preventive actions are needed to be processed. To identify and understand the quality problems. The first step is to investigate and find the root cause of the problems. The corrective action lists will be created for approving and implementing in the next step and the corrective action will be performed. The jointed problem solving between the company and its suppliers are needed to solve this problem under the supplier development program. The relationship of both parties for improving performance is necessary.

Additionally, the main reason of the research focuses on the quality performance only comes from the customers' rejection due to the product quality problems and other performances such as punctuality, price, or capability of suppliers which are not found as the problems in these areas.

3.3 Designing the Supplier Development Plan

The company will set the performance target and plan to do the process of supplier development for supplier performance improvement and joint monitoring the supplier performance when the business grows and changes. The goals, metrics and strategies will be recalibrated and monitored to align with objectives of the company.

3.4 Summary

The research methodology of this chapter begins with the required data and data collection derived from documentary reviews and interviews of functional departments, focusing on working process mapping and quality problem identification. Also, how to design the supplier development plan has is explained.

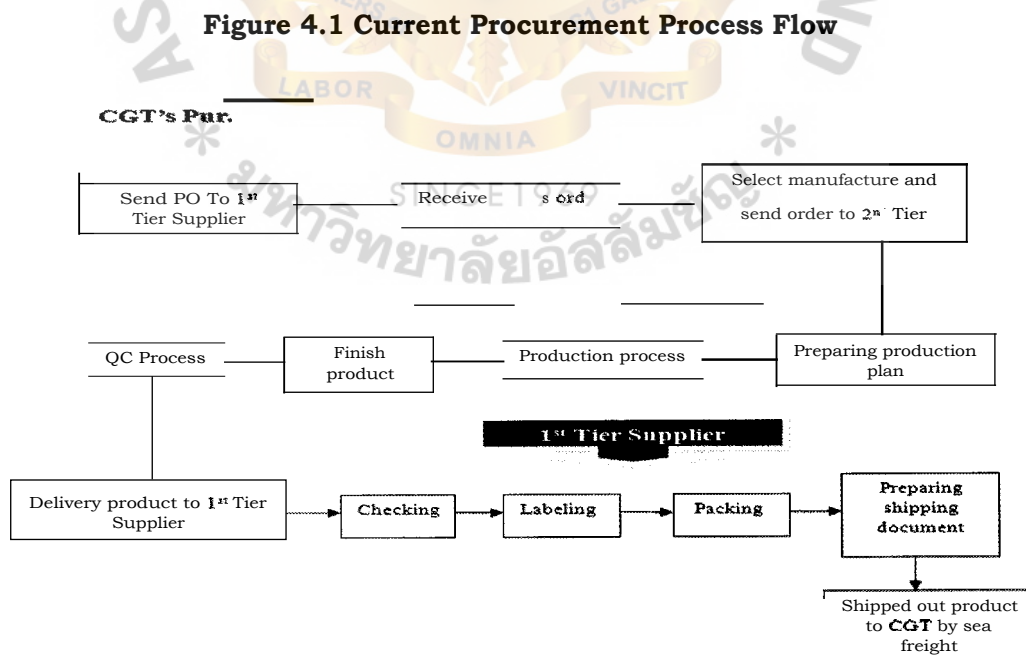
CHAPTER IV

PRESENTATION AND CRITICAL DISCUSSION OF RESULTS

This chapter consists of five sections: 1) current procurement process flow; 2) quality problems and root cause analysis; 3) design of the quality control process; and 4) potential outcomes of the supplier quality control program; and 5) summary. Details of each stage can be discussed as follows:

4.1 Current Procurement Process Flow

Figure 4.1 presents the current procurement process flow that shows the procurement work process mapping of CGT which composes of three parties: CGT, the first tier supplier and the second tier supplier. The working process begins when CGT's purchasing department places the purchase order (**PO**) until the end of process, shipping out the products to CGT. The details are presented in Figure 4.1 as below:



Source: Author

Once the inventory of the CGT products is replenished, the purchase requisition (PR) is made. CGT purchasing department places the purchase order (PO) to the first tier suppliers who are trading agents. The suppliers, then, start processing their work by selecting manufactures from their approved supplier lists and sending orders to the selected second tier suppliers who are manufacturers. The processes of a production plan, a production process, finished products, a quality control and delivering the products are done by the second tier suppliers. The first tier suppliers are responsible for checking, labeling, packing and delivering by sea freight to the Bangkok Port. Then, CGT shipping, responsible for the process of shipment, clearing and delivering products to CGT warehouse, QC Department, randomly inspects the incoming products. If any quality problems are found, the inspection and inspection report must be done within 24 hours. The quality control processes are operated as follows:

1. Checking the defective percentage of problems that has 2 cases as shown below:

- a) If the defective percentage of products has the percentage as of the quality control standard of CGT procedure, it will be passed from the QC Department inspection.
- b) If the defective percentage of products is higher than the quality control standard of CGT procedure which concerns food safety, the QC Department must reject the whole shipment and return all products to suppliers. The inspection report of major problems must be sent to the related department and taken to the product rejection process which the purchased contract from CGT notified the case of quality unconformities, CGT should file the claimed and rejected products and return to suppliers within 15 days after the arrival of the products at the warehouse destination because this time line that CGT and the supplier agreed in the purchased contract is a suitable for clearing poor the product quality out of CGT warehouse for preventing the storage cost that CGT must charge back to suppliers and the vessel line of China uses lead time to discharge the returned product sailed to suppliers around 10-12 days.

2. Quality complaints are prepared and sent to suppliers by the QC Department to find out the root causes and corrective actions.

Additionally, the data of the total sale volumes and the frequency of replenishment are shown in table 4.1 below:

Table 4.1 Total Sale Volumes and Frequency of Replenishment in 2012

Month	Total Sale Volumes (kilogram)	Frequency of Replenishment (Shipment)
January	140,227	2
February	154,405	4
March	169,654	6
April	161,220	3
May	184,007	5
June	193,612	6
July	185,190	2
August	189,552	4
September	171,248	4
October	210,561	4
November	213,146	6
December	230,121	5
Total	2,202,943	51

Remark: Each shipment has maximum capacity of 26,000 kilograms. / shipment /container.

Source: The Company's data

Table 4.1 shows that the total sales volumes in 2012 are 2,202,943 kilograms consisted of replenished products from suppliers in total 51 shipments.

4.2 Quality Problems and Root Cause Analysis

In order to assess the root cause of quality problems, document reviews performed in the inspection report of the QC Department are analyzed together with the observation of the incoming products. Then the root causes of the problems are analyzed as follows:

4.2.1 Product quality Problems

The main quality problems can be categorized into three main problems recorded in the inspection report derived from the QC Department:

- 1) Contamination of foreign materials
- 2) Over/under specification (non-conforming product specification)
- 3) Over defective standard

Table 4.2 presents some examples of the product quality problems in each category.

Table 4.2 Some Examples of Product Quality Problems

Quality Problems	Products	Details		
Contamination of Foreign Material	Spinach ball and Spinach cut	Found plastic pieces and scraps of rope		
Over / Under Specification	Soybean LBS.	Found product has thickness > 7mm (Overl Specification)		
Over Defective Standard	Soybean LBS.	Spot, Discoloration, Damage & Broken pieces 8.43% (std <=5%)		

Source: Quality Control Department

Three categories of product quality problems are shown in Table 4.1. The first one is the contamination of foreign materials such as plastic pieces and scraps of rope in the spinach ball and spinach cut. The second one is the non-conforming product specification such as the over specification of soybean which its thickness is more than 7 millimeters from the CGT product specification. The third one shows the soybean which has over defective standard; 8.43% of it have spots, discoloration, damage and broken pieces.

In the year 2012, the company had many incoming shipments. Table 4.3 demonstrates the total incoming products and the quantity of poor product quality in three categories.

Table 4.3 Total Incoming Products and Poor Quality Products in 2012

Month (2012)	Incoming Products (kilogram)	Poor Product Quality (kilogram)	Poor Product Quality (THB)	Percentage of Poor Product Quality
January	110,000	30,000	1,200,000	27.27%
February	100,000	40,000	1,800,000	40.00%
March	120,000			
April	132,000	35,000	1,575,000	26.51%
May	106,000	24,000	1,080,000	22.64%
June	112,000	40,000	1,800,000	35.71%
July	128,000	24,000	1,089,000	18.75%
August	115,000	-	-	-
September	100,000	10,000	450,000	10.00%
October	90,000	20,000	900,000	22.22%
November	118,000		-	-
December	130,000	24,000	1,080,000	18.46%
Total	1,361,000	247,000	10,974,000	18.14%

Source: The Company's data

Table 4.3 shows that the quantity of poor product quality is 247,000 kilograms which is about 10,974,000 THB or 18.14 % in the year 2012. The unequal and unpredicted amount of poor product quality of the shipment arrival in each month caused by the standard of the production process and the quality control system of each manufacture is different . This may be caused by human errors and machine errors in the process of selecting good and damaged products in the production line which is found that the spots, discoloration, broken pieces not conforming to the specification and foreign materials in the products that occur unpredictably.

The summary of the product quality problem categorized into types of errors found in the year 2012 is concluded in Table 4.4:

Table 4.4 Product Quality Problems in 2012

Quarter	Total Shipment	Contamination of Foreign Materials <i>Standard Requirement: 0% (Not detected)</i>	Over/Under Specification <i>Standard Requirement: Depending on the specification of product</i>	Over Defective Standard <i>Standard Requirement: <=Not more than 5%</i>
1	12	4.86%	Conform	6.95%
2	14	0.00%	Not conform	5.25%
3	10	2.56%	Not conform	5.83%
4	15	3.08%	Not conform	7.21%
Average		2.63%	Not conform	6.31%

Remark: Quarter 1: January to March; Quarter 2: April to June; Quarter 3: July to September; Quarter 4: October to December, 2012

Source: The Company's data

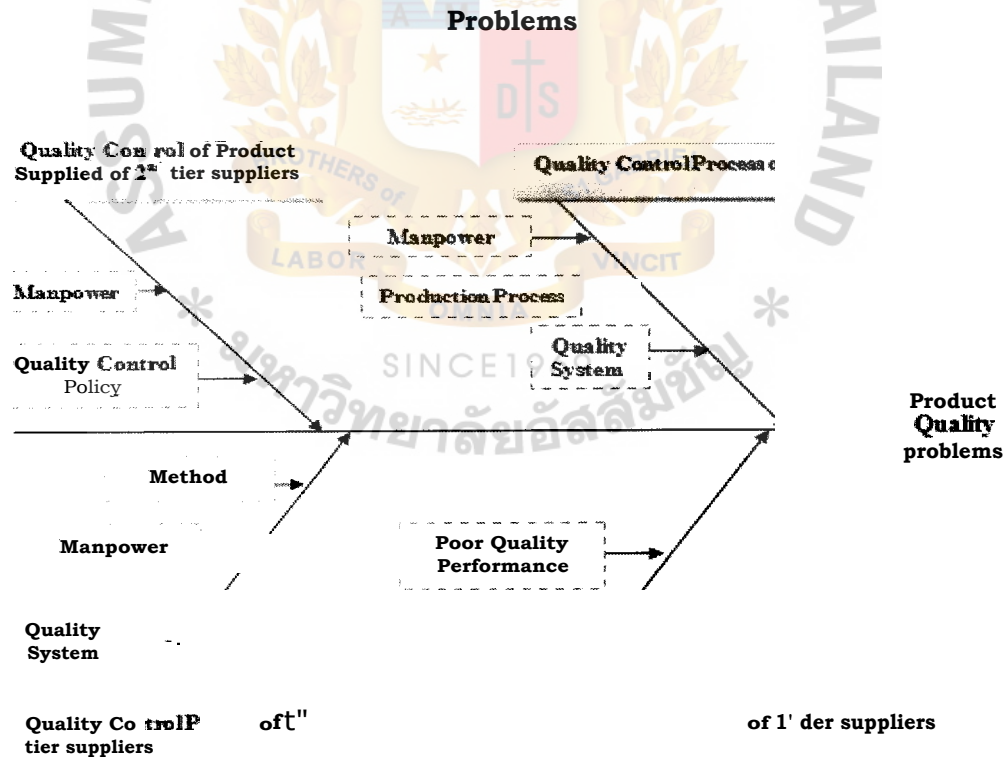
Table 4.4 presents the product quality problems in the year 2012. Each quality has been found in detail and is categorized into three types. The first one is the contamination of foreign materials that the standard requirement does not detect, this

shows that the products are not from foreign materials, but all the 51 shipments of the year 2012 shows 2.62% of quality problems regarding the shipment and the products are rejected by the QC Department. Second, over/under specification has the standard requirement depended on the specification of each product, so the average result finding from total 51 shipments does not conform to CGT's specification and finally, over the defective standard, the standard requirement must not detect more than 5% which the average result finding of year 2012 is 6.31% of the total shipment.

4.2.2 Root Cause Analysis

Figure 4.2 presents the fishbone diagram for concluding the root causes of product quality problems as follows:

Figure 4.2 Fishbone Diagram for Concluding the Root Causes of Product Quality



Source: Author

Based on the quality problem analysis, it can be implied that the quality problems is on the supplier quality control process and the quality control of the products is supplied by the manufacturers which are second tier suppliers.

CGT has three main suppliers in China. These trading agent suppliers seem to have supplier selection and supplier quality control problems. The illustration of the product quality problems shows the poor quality control process in the production process of the second tier suppliers. Therefore, the CGT should develop a control system over its first tier suppliers while the quality control process that the first tier suppliers use to control over the quality of the products from the manufacturers should be set.

4.3 Design of the Quality Control Process

To improve the quality control process for the second tier suppliers, the random inspection process as well as the establishment of the document for quality testing report should be added. The quality report is required to be attached with the products in all shipments. The details are presented as follows:

4.3.1 Product Random Inspection

The process of product random inspection have determined by the percentage of random is 5% of each manufacturing lot and must have three testing results from the process of random inspection that passed from contaminated with foreign materials, product conforming to specification and defective control standard.

4.3.2 Establishment of Quality Report System

The product random inspection process requires the quality testing report that the second tier suppliers should establish the report for random inspection results in the report which its contents should cover all the three requirements:

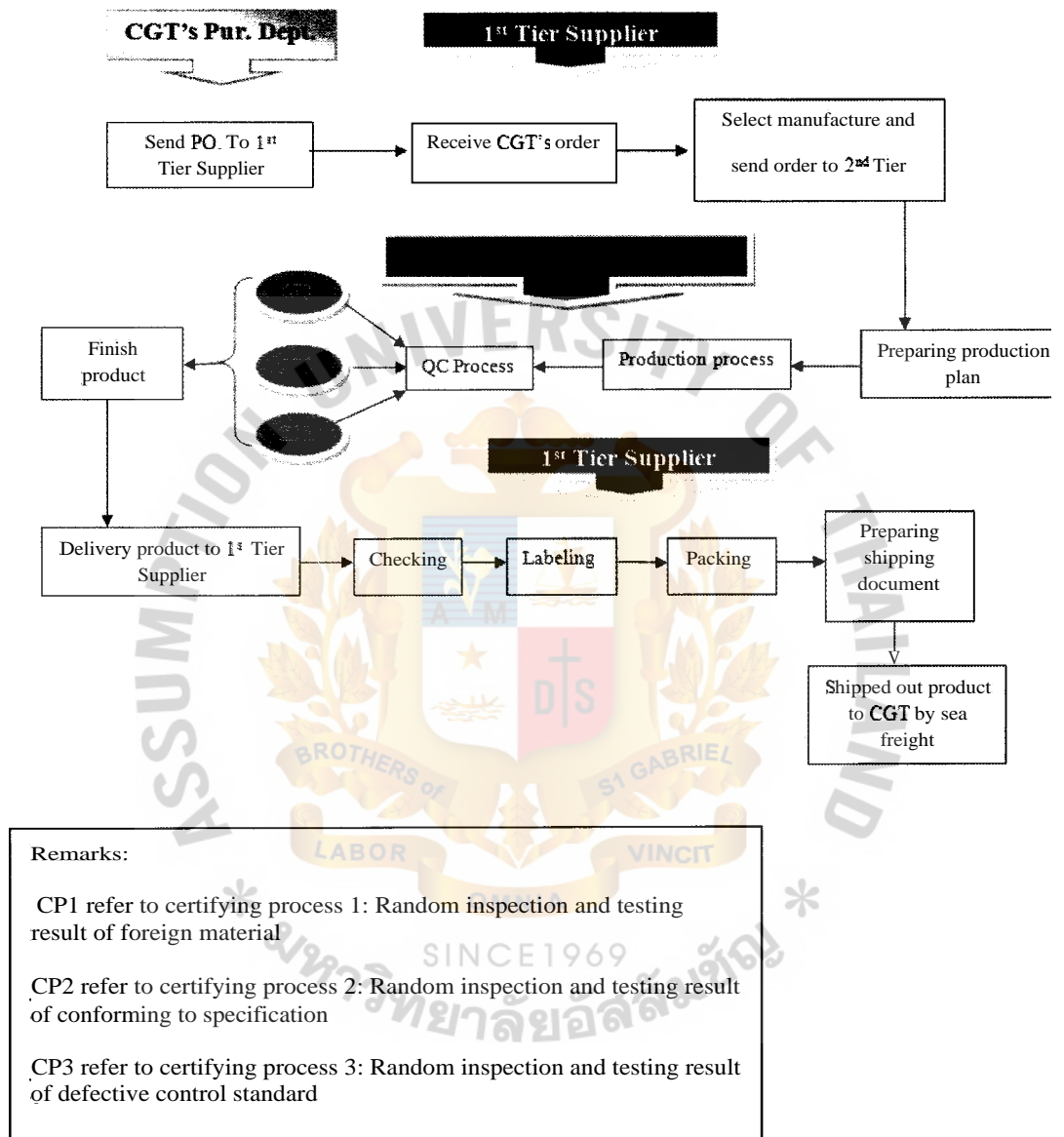
- 1) Report indicating that the products are not detected contaminated with foreign material in order to ensure that the foreign material is 0%.
- 2) Report indicating that the products conform to CGT's product specification which determined size, color, flavor, texture, microbiology, pesticide, shelf life, net weight, storage temperature and packing characteristic, to ensure that each product is conformed with CGT's product specification.
- 3) Report indicating defects (e.g., spot, discoloration, broken pieces) on each product with the defective standard which is equal or not more than 5% .

These reports of random inspection results are required for the second tier suppliers to attach it with the products in all shipment.

4.3.3 New Procurement Process Flow

Figure 4.3 proposes the new procurement process flow to improve the quality control process of the second tier suppliers for enhancing the quality performance of suppliers to the standard level which is shown below:

Figure 4.3 New Procurement Process Flow



Source: Author

According to the joint of CGT and the first tier suppliers, the improvement of the quality control process of the second tier suppliers should be done by adding the certifying process of product random inspection and the establishment of the report of

random inspection result which consist of three quality testing results that the second tier suppliers must attach this report to the products in all shipments.

4.4 Potential Outcomes of the Supplier Quality Control Program

According to the research purposes the quality control process is designed to improve the quality of the products from the manufactures or the second tier suppliers by adding the random inspection process which determines the percentage of random with 5% of each manufacturing lot. This has three random inspection results passed from the quality problems of contamination of foreign materials, product conforming to specification and defective control standard. The report content includes three requirements: 1) report of not detected 0% of contamination with foreign materials; 2) report of product conforming to specification; and 3) report of defective standard.

The expected result after implementing the new quality control process is a process for continuing improvement of suppliers. This will be used to solve the quality problem of the products delivered to CGT. The quality performance improvement is the potential outcomes for suppliers and CGT. The rate of product returned from customer's rejection can increase customer satisfaction. Moreover, it can provide benefits and improve competitive advantages to CGT and suppliers by providing higher quality products and services at a lower total cost.

Table 4.5 Summary of Total Sales in 2012

Total Sales Volume (Kilogram)	Product Rejection (Million THB)	Total Sales Amount (Million THB)	Ending Total Sales Amount (Million THB)
2,202,943.00	6.19	133.15	126.95

Source: Author

In order to see the effectiveness of this research, table 4.5 shows that the total sales of the year 2012 is 126.95 million THB with the product rejection of 6.19 million THB. The expected total sales in the year 2013 after implementing the new quality control process can solve the product quality problems and improve the quality performance of both CGT and suppliers; accordingly, it is expected that there is no product rejection from customers and the total sales could be increased by 6.19 million THB which is equal to the rejected amount of the product.

4.5 Summary

Quality problems and root cause analysis are performed for assessing the root cause of quality problems that impact on the quality performance of CGT and suppliers. The product quality problems of suppliers in the year 2012 show the three main quality problems which are found from the poor quality control process of the second tier suppliers. Therefore, CGT and trading agent suppliers who are the first tier suppliers joint to solve the product quality problems of the second tier suppliers by designing the quality control process. This also includes the process of random inspection and established report of quality testing results to the second tier suppliers for enhancing the performance of suppliers to the standard level and continuing improvement.

CHAPTER V

SUMMARY FINDINGS, CONCLUSION AND RECOMMENDATIONS

This final chapter includes the summary findings, conclusion of the research, theoretical implications, managerial implications and the recommendations for future research.

5.1 Summary of the Findings

Chapter 4 discusses the way for assessing the root cause of the quality problems by analyzing the product quality problems of suppliers. It is apparent that poor quality performance is caused by the poor quality control process. CGT concerns the impact of the product quality problems of suppliers and finds out the solution for solving problems with trading agent suppliers who are the first tier suppliers. There is the designed process of random inspection and the report of quality testing consisting of the three quality testing results: 1) 0% of foreign material; 2) detected products conforming to CGT's specification; and 3) defective control of not more than 5% assigned to the second tier suppliers or the manufactures and attached to CGT product reports in all shipments. The design of quality control process will be used to enhance the quality performance of suppliers to the standard level which is beneficial to both CGT and suppliers.

5.2 Conclusion

The CGT Company has lost of sale revenues, as shown on the rate of product rejection from customers in 2012, at 6.19 million THB. The main factor that leads CGT to the poor performance is the product quality problems. The research aims to assess the root cause of the quality problems and to design the quality control process to solve the quality problems of suppliers for improving the quality performance of CGT and suppliers.

The finding indicates that there are three main quality problems: 1) contamination of foreign materials; 2) over/under specification; and 3) over defective standard. It can be concluded that the quality problems are caused by the poor quality control process of the manufactures who are the second tier suppliers. The first tier suppliers are trading agent suppliers who cannot control the quality performance of the second tier suppliers who are more likely to have supplier selection and supplier quality control problems. To solve the quality problems, CGT designs the quality control process of random inspection that assigns the second tier suppliers to implement and establish the quality report required to be attached with the products in all shipments. The content of the report must cover all the three testing results: 1) the report of not detected contaminated with foreign material; 2) the report of product conforming to CGT's product specification; and 3) the report of defects about spot, discoloration and broken pieces of each product must be detected with the defective standard of not more than 5%.

The expected result from this research is to improve the long-term relationship with suppliers to solve quality problems that have long term commitments. The supplier quality performance improvement will decrease the quality problem of suppliers beneficial to both parties: CGT and suppliers. After implementing the new quality control process, it is expected that the positive impact will be increased; that is a number of sale volumes would become the sale revenues of CGT. No product rejection from customers will lead to the total sales of 133.15 million THB in 2013 which is improved from 126.95 million THB in 2012 with the product rejection of 6.19 million THB. This project would increase the total sales of CGT at 6.19 million THB which is equal to the rejected amount of product.

5.3 Theoretical Implications

The research uses the implementation from the supplier development program that designs the quality control process by adding the random inspection process for

solving the quality problems and improving the quality performance of the CGT and suppliers.

This implementation aims to the improvement of supplier quality performance that needs the first tier suppliers who are the trading agent suppliers managing their second tier suppliers which CGT set up the process and make the long term commitment with suppliers.

5.4 Managerial Implications

The purpose of this study is to assess the root cause of quality problems and design the supplier development program in order to develop the quality control process of suppliers that can help improve the quality performance of CGT and suppliers.

The supplier development is formed by designing the quality control process of suppliers which enhances the performance of suppliers to the standard level. At the same time, it helps reduce the quality problem and rate of customer's rejections which lead to more customer's satisfaction, increase competitive advantages and sale revenues to the CGT Company. The effectiveness from the new quality control process found in this research is that it can help solve the product quality problems. It is expected that the total sales in 2013 will be increased and the management team can share this positive impact to the cross functional team for realizing the importance of supplier development and can consider designing other functions to develop some other performances of suppliers which can also impact on organization's performance.

5.5 Limitations and Recommendations for Future Research

According to the research focuses, it is recommended that the future research on the supplier relationship management is the most important for keeping a long term relationship and a long term commitment with suppliers, this can be jointed to suppliers to solve problems when an organization is encountering to major or minor

problems in the future. This can be a further step for improving other performances of an organization and increasing the competitive advantages as well as sale revenues in the future. Furthermore, the future research may apply other designs of supplier development programs in supplier site visits for assessing the supplier's performances. This will increase more value added for a relationship, and develop new products or services.



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