



SUPPLIER RELATIONSHIP MANAGEMENT - THE SERVICE
LEVEL AGREEMENT IN A PETROCHEMICAL COMPANY

By
YAOVALAK CHANTARABUMROONG

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

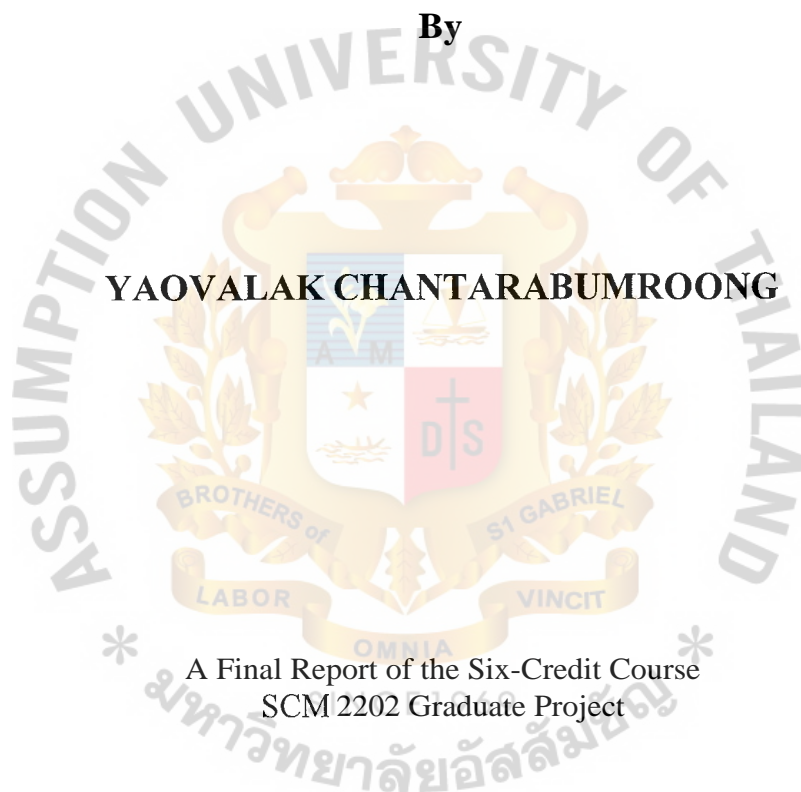
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Declaration of Authorship Form

I, Yaovalak chantarabumroong, declare that this thesis/project and the work presented in it are my own and has been generated by me as the result of my own original research.

Supplier relationship management – the service level agreement in a petrochemical industry: A case study.

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I confirm that this thesis/project has been carried out under my supervision and it represents the original work of the candidate.

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Date _____

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Yaovalak Chnatarabumroong

Assumption University

May 2013



ABSTRACT

This research presents the service level agreement strategy to improve service performance and supplier relationship. Currently this causes loss for the company. The idea is to combine the concept of service level agreement strategy to the real situation of business requirement.

The service level agreement strategy is a useful method to solve the current problem of poor service performance from service suppliers. The objectives for this research are identification of the problems, setting up the regulation of service level agreement and implementation based on service level agreement.

Results indicated that the service level agreement strategy can improve the service levels and develop supplier relationships. It could provide also more opportunities for management to develop on the criteria of service level agreement which leads to effectiveness to manage suppliers and efficiency of supply chain management.



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I, Asst. Prof. Dr. June Bernadette D'Souza, have proofread this thesis/project entitled
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CHAPTER I

GENERALITIES OF THE STUDY

Supply chain management is an essential element for operational efficiency. Efficient supply chain management can lead to customer satisfaction and company success. As the supply chain network begins from the supply side, the firms that can manage its supply resources and have a good relationship with suppliers gain more competitive advantages by using high quality materials and lowering material costs. Thus, supplier relationship management (SRM) plays an important role in the reduction of costs and the optimization of performance in industrial enterprises.

1.1 Background of the Study

A Petrochemical industry nowadays has to deal not only with expensive raw materials but also high cost of warehousing (Tank storage) and transportation since transport and tank storage of petrochemicals are under the national security regulation. According to quality assurance for expensive and high value material, the specification of chemical storage and transportation are as follows:

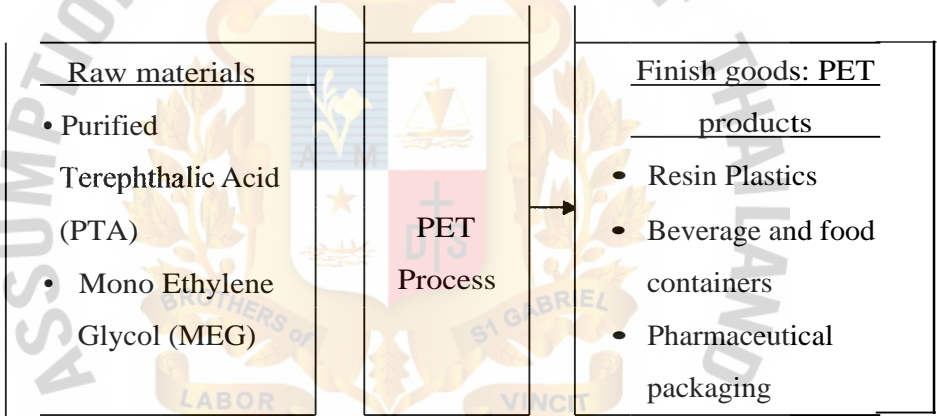
1. Storage tanks should be specialized with stainless tank and protected from fire, heat, and any factor that leads to raw material contamination.
2. All operation and transportation activities need to control potential hazardous, dangerous and flammable situations.
3. Specialized needs by used truck transportation and equipment also.

ABC Company is primarily polyester chain business with headquarters in Bangkok, Thailand, with 39 operating sites established in 15 countries across four continents — Asia, North America, Africa and Europe. The corporate structure comprises of 4 business segments are 1) Polyethylene Terephthalate (PET) business, 2) Polyester business, 3) Purified Terephthalic Acid (PTA) business, and 4) Wool business. ABC's

products serve major players in the diversified end use market, including food, beverages, personal and home care, automotives, textile, and industrial products.

In 1995, ABC entered the petrochemical industry with the establishment of a PET (Polyethylene Terephthalate) resin facility in Thailand with three manufacturing factories located in Lopburi, Nakornprathom and Rayong. PET plastic is safe for beverage and food containers, pharmaceutical, household product packaging and industrial packaging applications as indicated in Figure 1 for PET process flow. The main raw materials to produce PET are petrochemical products which are derived from crude oil and natural gas.

Figure 1.1: PET Production Process



Source: Author

Figure 1.1 describes the main production process of PET plastic products. For ABC the main raw materials are PTA and MEG used principally in the manufacture of PET (Polyethylene Terephthalate). After passing the PET process by polymerizing the finished good, produced are goods are PET resin, PET preform, bottles, closures, food containers and pharmaceutical packaging.

ABC has uses the outsource supplier for warehousing (tanks storage) and transportation. ABC orders raw materials from the offshore suppliers. The raw

materials are usually unloaded from vessel to tanks and delivered to the ABC plants by tank service and transportation suppliers. Tank suppliers and transportation suppliers, in this study are hereafter referred to as "Service suppliers." The key responsibilities of the service suppliers are port service, tanks storage service and transportation service as describe as follows.

1. Service suppliers arrange the port for vessel berthing safety. If the vessel is ready for berthing but the port is not available it will cause demurrage penalty to the ABC.
2. Service suppliers inspect raw materials before unloading and providing official results to ABC within 24 hrs after completing inspection.
3. Service suppliers inform the total quantity received to the ABC on a monthly basis. This report consists of vessel berthing time, vessel name, quantity as per bill of lading and actual quantity received of each shipment.
4. Service suppliers deliver raw materials to ABC plants as per schedule updated from the ABC. It also provides the delivery report to ABC on daily basis.
5. Service suppliers provide the monthly inventory report to ABC. This report is useful for ABC to check and verify raw material shortage which occurs during service supplies operation and delivery.
6. Service suppliers prepare the invoice for ABC for operation service charge based on actual quantity received from vessels, tank rental charge, transportation charge and over time charge.

1.2 Statement of the Problem

The ABC's Polyethylene Terephthalate (PET) segment in Thailand currently faces problems about the reliability and up-to-date information and documents especially from the tank and transportation suppliers. Some errors on the documents such as price discrepancy and quantity discrepancy, credit warranty and service quality problems i.e. uses of the incorrect trucks and delay vessel berthing schedules are

illustrated. These lead to demurrage penalty charge and ABC has to pay the raw material suppliers. Records of ABC in the year 2011 to 2012 indicate problems of tank and transportation suppliers that can be classified into 3 types as follows.

1. Unreliable Documents

ABC faces problems with the correctness and reliability of invoices from tank and transportation suppliers. The problems are with quantity discrepancy and price discrepancy i.e. quantity on invoices does not match with quantity as ABC recorded and prices on invoices does not match with the quotation.

2. Unreliable Creditworthiness

Delay occurs on the credit notes from tank and transportation suppliers. The quotation, service suppliers provide credit notes to ABC once a volume of 95,000 tons per year is achieved. ABC already achieved this for 2011-2012. But, currently, suppliers have delayed releasing credit notes to ABC since 4 months after amount of credit notes were agreed upon by both parties.

3. Service Quality Problems

ABC also faces problems on the three core services provided by the service suppliers. First is on the shortage of the raw material from the service suppliers. The service suppliers would undertake reasonable efforts to ensure that there is no shortage of raw materials during storage in the tanks and operation activity to delivery raw material to ABC manufacturing. But the record for year 2011- 2012 show that the total amount of shortage is about 1,940,259 THB and the details are as follows.

1. Total value of shortage is 860,751 THB of raw material cost for the year 2011. As the raw material cost is expensive, the average cost is 36,583 THB per ton, when compared with the average landed cost is about 89% of total landed cost per ton.

2. Total value of shortage is 1,136,460 THB of raw material cost for the year 2012. The average cost for this year is 41,463 THB per ton, when compared with the average landed cost is about 87% of total landed cost per ton.

As the result, the trend value of shortage has increased, for the year 2011 by 860,751 THB and for the year 2012 by 1,136,460 THB which an increase of about 32% compared with 2011. The raw materials are derived from crude oil and natural gas therefore; the raw material price trends is always increases every year. The raw material price increases by about 3,000 - 5,000 THB per ton. The shortage of raw material leads ABC to faces with the cost increases as well as increases of total landed cost. Not only cost concerns but also impact with manufacturing – production is a problem because on time delivery with full quantity is very important. If this problem still persist it will leads ABC to encounter competitive disadvantages, disadvantages on cost leadership and loss in the long run.

The second problem is about the demurrage penalty charges. The demurrage is penalty for delay of unloading raw materials from vessels to tanks and keeping the vessels waiting to berth. It occurs when the total time used for unloading raw materials to tanks extends beyond the time allowable. As the record shows in the year 2011-2012, ABC has to pay the demurrage penalty charge to raw material suppliers. For the year 2011 a total of 1,615,833THB approximately 3% of total service supplier cost or demurrage charge for about 9 vessels from a total of 24 vessels approximately is paid 38% of a total the vessels arrived. For the year 2012 the demurrage penalty charge is about 265,674THB approximately 3% of total service supplier cost or demurrage charges for about 2 vessels from a total of 20 vessels approximately 10% of total vessels arrived.

The raw materials are a key part of the petrochemical industry as well as for ABC's strategy to ensure the maximum margin by minimizing costs and reducing costs. ABC has added the penalty demurrage costs into logistic costs which lead to an increase in

landed cost of raw materials also. That is landed costs increases because of the service suppliers not completing the best performance. For the year 2011-2012 the penalty demurrage, affects cost increases by 6%, approximately 1,881,507THB.

The petrochemical industry faces with high costs of raw material actually, even during times of economic uncertainty. Any loss in the supply side will leads to loss throughout the supply chain.

In addition, the service suppliers realize ABC's business goals and realize that in the past their performance did not fulfill the customer's needs and expectations. Therefore, this is the one opportunity for service suppliers to develop performance.

Because of the problems mentioned above, the service level agreement strategy is considered for application. Karten (2003) stated that a service level agreement is an excellent mechanism for creating a common understanding between service providers and the customers about service and service delivery. The concepts of service level agreement are to manage suppliers to delivery service effectively and enable parties to improve communication, better understanding on the requirements, clarify expectations and priorities. It also provides an opportunity for service suppliers to improve service quality to meet the customer's needs which means improving to long term relationship and win-win situation between service suppliers and customers. Therefore, the problem statement of this study constructed is proposed as: *"How to identify the criteria of service level agreement and set up the regulations to implement it through the service level agreement strategy?"*

1.3 Research Objectives

The main research objectives of this study are as follows.

1. To identify an appropriate criteria of service level agreement with service suppliers.
2. To set up the regulation of service level agreement based on service level agreement strategy.

3. To implement the regulations set up for service level agreement and to monitor and measures the service performance level.

1.4 Scope of the Research

This research will study the service level agreement between ABC and service suppliers. Only PET segment is focused which produces PET plastics. Customers are concerned with food and beverage container manufacturing and plastics packaging applications manufactured in Asia. The suppliers involved in this research are service suppliers. The main roles of the service suppliers are arranging the port affairs for vessel berthing, unloading the product from the vessels, tank rental storage and delivery of raw materials from tanks to the ABC's manufacturers. The service level agreement process is involved with the procurement department of ABC and customer service of service providers. The performance of service providers and relevant data recorded in the year 2011 and 2012.

1.5 Significance of the Research

The significance of this research is the criteria of service level agreement implementation which could be of help for ABC to improvement the service quality of service providers and also improve relationship for both sides. This research would provide an opportunity for management to consider further development on the list of service level agreement and implementation which leads to effectiveness to manage suppliers and efficient supply chain management, increasing customer satisfaction and company success is of crucial importance.

Besides, this study also provides a great opportunity for researcher to understand the concept of service level agreement and how to apply service level agreement strategy in the real business world.

1.6 Limitations of the Research

This study focuses on improvement and developing performance and relationship with service suppliers by using service level strategy. That study identifies the criteria of service level agreement. Because of the limitation of time, the researcher considered the historical data for 2 years which are 2011 and 2012 only.

Moreover, this study focuses on the cost from service suppliers, occurring because of tank storage and transportation activities. As of some data is confidential, the final price of raw materials could not be used in this research, therefore raw material costs are calculated based on the Asian market price of an average or percentage. Deep details of PET production process are difficult to obtain, therefore the researcher presents only the overall picture of PET production process.

1.7 Definition of Terms

Demurrage Penalty charge	The penalty charge from raw material suppliers. The demurrage arising from the total time used for unloading the product from their vessel (including vessel waiting to berth) to tanks extends beyond the time allowable. These activities are handled by service providers.
Landed Cost	The total cost of landed shipment. There includes raw material costs, freight and transportation costs and insurance costs.
Polyethylene Terephthalate Plastic (PET)	Polyethylene Terephthalate is known as "PET" produced from chemicals. PET is one of the most widely-used for beverage, food and pharmaceutical packaging worldwide.

Raw Material Raw material mainly used to produce PET plastic are Purified Terephthalic Acid (PTA) and Mono Ethylene Glycol (MEG).

Service Level Agreement (SLA) A tool which ensures delivery consistently appropriately and timely service quality to meet the business need at the right price (Hiles, 2004) which is specified in the requirements and expectations from customers.

Service suppliers Service suppliers supply Tank rentals and transportation services.

Tanks storage The stainless tanks for storage of petrochemical liquids.



CHAPTER II

REVIEW OF RELATED LITERATURE

The idea of supplier relationship management is to give priority to suppliers. Managing relationship with suppliers are mutually beneficial to both the firm and its suppliers. Monitoring supplier performance is a tool that systematically works with suppliers on improving the supplier's quality and performance (Joris, 2010).

2.1 Supplier Relationship Management

Nowadays many organizations focus an implementation of the Supplier relationship management (SRM) which is the key element that enables the suppliers to provide good quality of raw materials and services. According to Douglas (2004), "Supplier relationship management is the supply chain management process that provides the structure for how the relationship with suppliers is developed and maintained" (p. 53).

Effective working relationships with suppliers have increased in strategic importance due to the many potential contributions. These suppliers can help to control total manufacturing and operations costs and to build market requirements into their products and services. (Manczka & Choi, 2011). -Therefore supplier relationship management helps creating the benefits for the firm.

2. 2 Suppliers and Service Level Agreement

Supplier is person or organization that supplies goods or services to other business firm. Suppliers are the key factor for the company success. Therefore good quality of products and service suppliers must be selected in order to meet all the requirements and obligations. Apart from quality, ability to respond to the needs of the business is also an important factor.

One method commonly used to make service suppliers meet the needs of the business is service level agreement. With the service level agreement a company can specifies the target, expectations and specified performance standard with suppliers. Generally primary responsibility for each party are services to be provided, standard of service, duty of each party, form of payment, management issues or problem which may be occur and payment of compensation in case of a mistake or no compliance with the contract.

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2.3 Service Level Agreement

According to Barbara (2012), Service level agreements have been widely used since the late 1980. Initially they were used by telecommunication outsourcing firms to monitor service to clients; now SLAs are applied to all types of outsourcing arrangements and even between separate departments within a company. The definition of service level agreement provided is as follows.

1. Service Level Agreement is an agreement between the service providers and its customers quantifying the minimum acceptable service to customers (Hiles, 2000).
2. Service Level Agreement is a agreement that helps identify the relationship between two groups: the suppliers and the beneficiary (Gerard, 2008).
3. According to Miles, Unterreiner and Ashley, (2007), "Service Level Agreement is a contract between a service provider and its customers that defines the services provided, the indicators associated with these services, acceptable and unacceptable service levels, liabilities on the part of the service provider and the customer, and actions to be taken in specific circumstances" (p. 7).
4. According to Neil and Allen (1999), "The service level agreement process involves the customer and service provider agreeing on suitable targets for particular services. This process is also treated as a commercial transaction, and the services are paid for by the customer. The achievement of these targets is measured and any discrepancies are discussed and resolved openly" (p. 3).

Miles et al. (2007), said that An SLA is generally a contract between two organizations: an external service provider and a customer. This type of SLA is called an external SLA (p. 7). Therefore this study categorized the external service level agreement which is the service level agreement between the service provider and the ABC. The service level agreement enables the service provider to improve the performance and also enable the customer to review the priority of service. This literature will be applied in this study for both process and SLA structures on service level agreement.

2.4 Benefits of Service Level Agreements

Service level agreements have become increasingly popular, with more and more businesses realizing its benefits (Gerard, 2008). The aim of service level agreements is to improve quality of service. According to Neil and Allen (1999) the service level agreements enable to provide benefits to both of customer and the service provider and are as follows.

- 1_ Set clear performance expectations of the customer and service provider. Both the sides are clear with the performance expectations. That will lead to achieve the performance expectations.
2. Clarifies the roles and responsibilities of both parties. It helps both the sides to improve performance and get all the data and information on time as both the sides understand the duties and job responsibilities. It also improves relationship for both sides.
3. Focuses attention on customer's priority needs. The real priority required by the customer is clear. The service provider focuses on the customer's priority and this leads to win-win situation for both sides.
4. Encourages a service quality culture, and continuous improvement. There are cost advantages and improvement of relationship for both the sides.
5. Provides a mechanism for both parties to plan the future. Both sides are aware of the results of service level that lead to improvement of the service quality plan in the future. This enables to develop supplier relationship also.

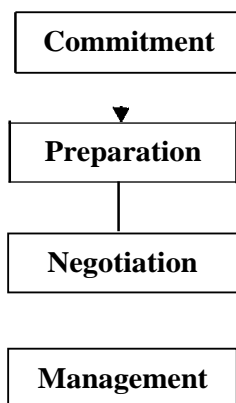
6. Put purchasing power into the hands of the customers. This is the advantage for customers to gain bargaining power and negotiate and discuss with service providers to achieve the performance expectations, real priority needs, and better service quality.
7. Service providers are in a better position to plan their delivery functions. Service providers understand the customer expectations and priorities. Service providers can plan for their functions to serve the customer expectations and priorities.
8. Provide greater certainty of income for service providers. This is a competitive advantage for service providers so that to better service quality at the lowest cost to customer can be delivered.

2.5. Service Level Agreement Process

The basic steps of the service level agreement were summarized by Miles et al. (2007) and are as follows.

1. **Commitment:** This is the first step which requires commitment and approval from management in order to get support.
2. **Preparation:** This is the second step which requires relevant data and information for the service level agreement. The main idea is to specify on the requirements and expectations.
3. **Negotiation:** This step requires the draft of service level agreement for negotiation and discussion. The service level agreements including signatures are finalized. Also one copy for each party is kept.
4. **Management:** This step includes implementation performance measurement, monitoring service levels. If the goals of business or requirement and expectation changes, the changes in the service level agreement also occurs in order to create efficiency and effectiveness.

Figure 2.1: Basic steps of Service Level Agreement



Source: Miles et al. (2007)

The following are the explanation of each step.

2.5.1 Commitment Phase: In the first step consist of two subsections are as follows.

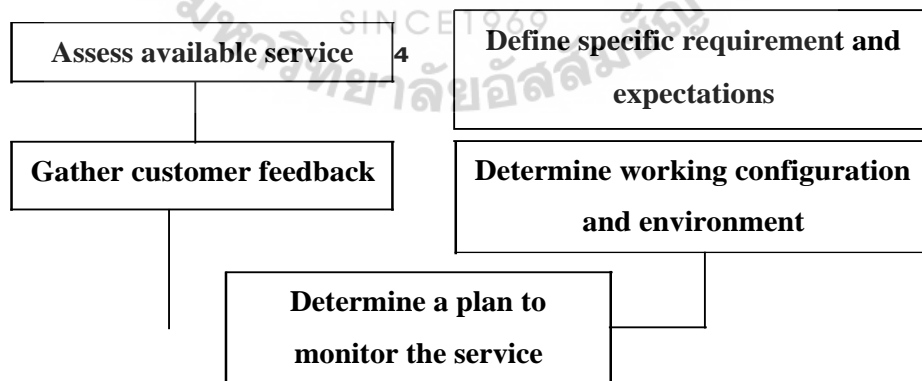
1. **Request the commitment from Management level:** The organization request for commitment from management in order to get the support from management.
2. **Creating the team to establish the service level agreement in the organization.** This means the staff has to directly respond and keep monitoring the service level once the service level agreement has been implemented, in order to ensure the efficiency and effectiveness.

2.5.2 Preparation Phase: The second step consists of five subsections which are as follows.

1. **Asses the Available Service:** The customer would be communicating with the service provider to review the service level carefully before making commitments.

2. **Define Specific Requirements and Expectations:** The customer will review the requirements and expectations carefully by making clear and assigning the priorities. **All** the relevant data is prepared and ready to convince the service providers to agree on the requirements and expectations.
3. **Gather Customer Feedback:** The customers gather all the feedback and comments from colleagues on the performance of service providers for before and after implementation of the service level agreement program. This can provide the results of customer satisfaction.
4. **Determine Working Configuration and Environment:** This is for customers to consider the working conditions and environment that have any impact to the notification or communication process e.g. Customers want the service provider to provide notification or report by email. Suppliers also provide the customers with intention which can be accessed via email.
5. **Determine a Plan for Monitoring Services:** The customers should set up Key Performance Indicators (KPIs) which are important indicators for planning and monitoring.

Figure 2.2 Preparation Phase

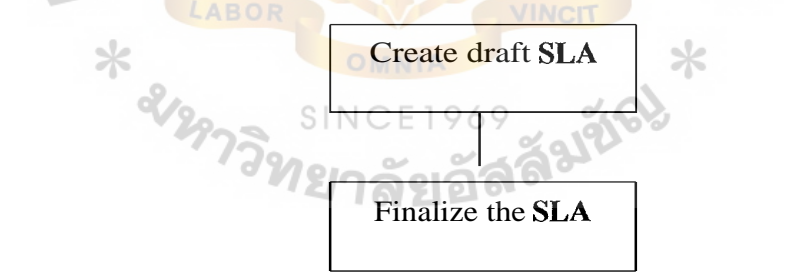


Source: Miles et al. (2007)

2.5.3 Negotiation Phase: The third step consists of 2 subsections which are as follows.

1. **Create Draft of Service Level Agreement:** When drafting the Service level agreement it is the important to clarify the requirements and expectations that are the goals. Both the sides may be having some differences in opinions therefore the draft will be negotiated and revised once agreement on all the terms and conditions are set up.
2. **Finalize Service level Agreement:** The Discussion and negotiation for both the sides to be discussion on the requirements and all the terms and conditions are specified with regard to monitoring service level agreement. During the negotiation customers and service providers will study each other for their approach issues in the future. This is a very importance process and all the key members are supposed to get involved, to provide suggestions and comments for improvement. Once both sides agree on the draft of service level agreement, a revision is made and released in final agreement 2 copies. Then the signature for both the sides on 2 copies is required. Each party keeps a copy of the original contract for evidence.

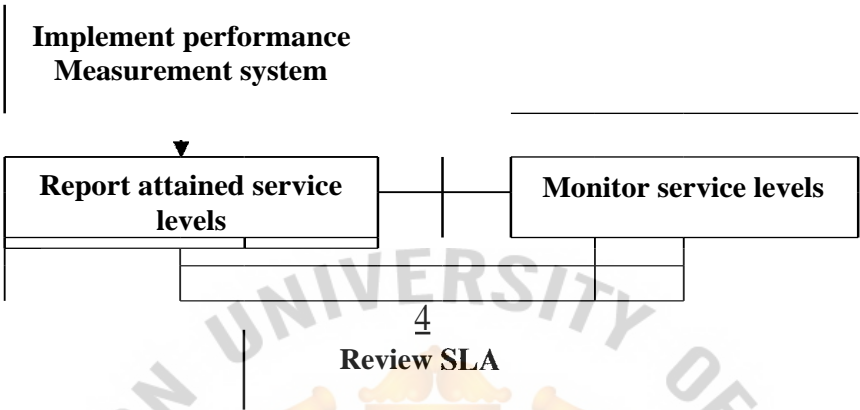
Figure 2.3: Negotiation Phase



Source: Miles et al. (2007)

2.5.4 Management Phase: The third step consists of 4 subsections which are as follows.

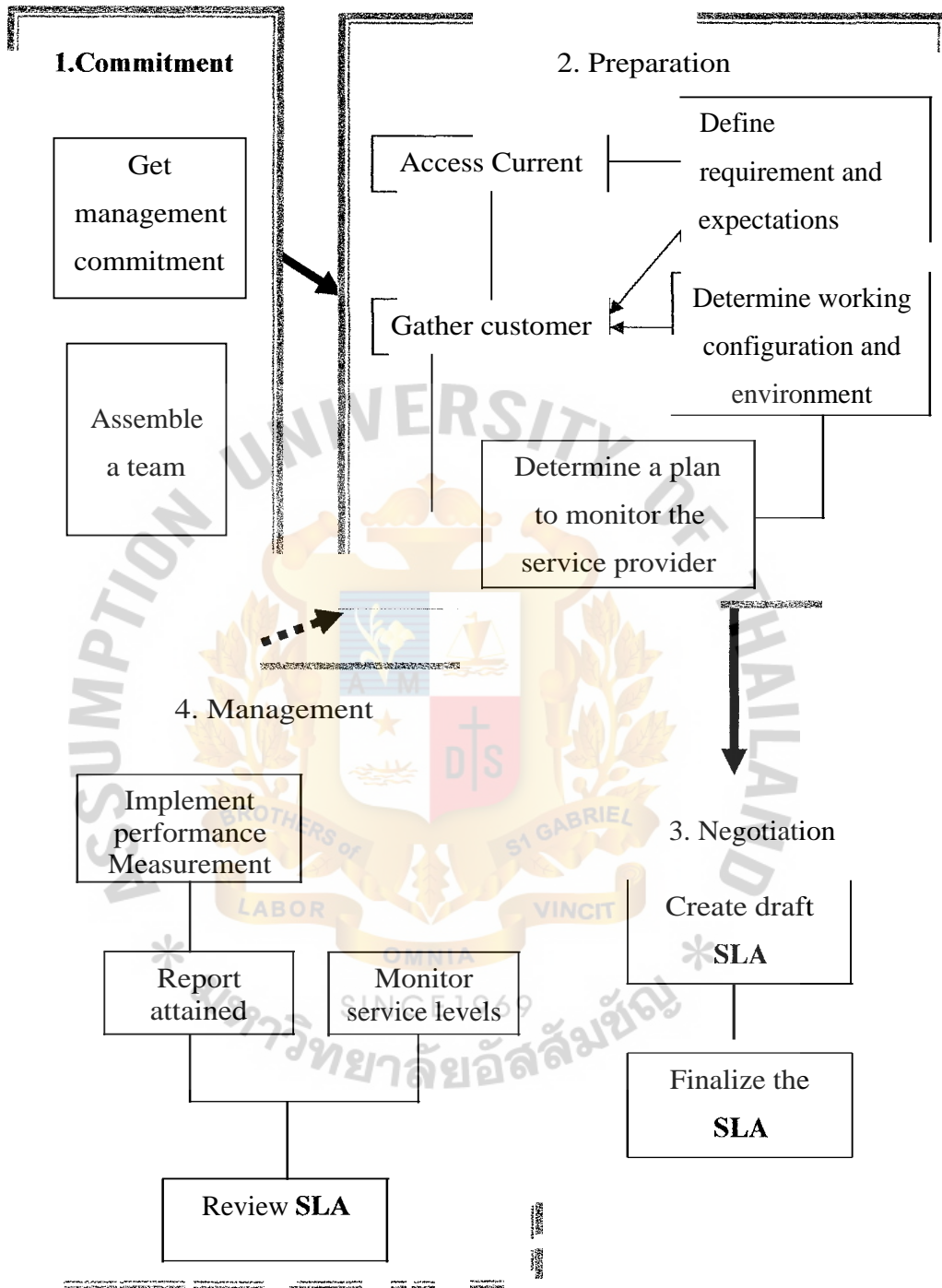
Figure 2.4 Management Phase



Source: Miles et al. (2007)

- 1. Implement Performance Measurement System:** The measurement process needs to keep collect actual data, results from the service provider and compare it with KPIs to analyze of the results in order to find how much service providers meet / fail with KPIs plans.
- 2. Report Attained Service Level:** The service providers shall provide the report / results which are achieve as per the agreement.
- 3. Monitor Service Level:** Monitoring and measurement process needs collect actual data, result from service providers and compare it with KPIs for analyses of the results in order to find how much service providers meet / fail based on KPIs plans.
- 4. Review Service Level Agreements:** Both parties shall review the service level agreement regularly. If the goal of business, requirements of the customer changes, the changes must be reflect into service level agreement to be efficient and effective.

Figure 2.5 Overall Service Level Process



Source: Miles et al. (2007)

2.6 Summary

The literature on Service level agreement describes that two parties are involved in the service level agreements. These are the customers and service providers. It also describes the basic process and structure of service level agreements. The service level agreements provide the opportunity for the service provider to improve performance to achieve customer requirements and expectations. It also provides an opportunity for customers to review priorities and define the requirements and create the KPIs. Therefore the service level agreement is a mutual benefit for both parties. One importance process is monitoring and measurement which both the sides shall discuss. Also continuous meetings in order to develop the service levels to meet customer needs will be held. Once the firm changes goals, it means some of the priorities and requirements also change. The firm must consider revising the agreement to meet the company business goals.



CHAPTER III

RESEARCH METHODOLOGY

This chapter describes the methods to identify the list of service level agreements Implementation of the service level agreement strategy as mentioned in the objective of this study in chapter 1 is also considered. This implementation consists of five steps which are as follows.

Figure 3.1 Research Process Flow



Source: Author

3.1 Data Collection

3.1.1 Review Documents

Review all the relevant data from ABC database and internal report is as follows.

1. Incorrect Invoice Charges Report: The data collection from 2011 to 2012 consists of a summary of the total incorrect invoices charged to ABC. This report can access directly from the database of the procurement department.

2. Credit Note Report: The data collection from 2011 to 2012, summaries the performance of issuance credit notes. This report can be accessed directly from the database of the financial department.

3. Shipment Report: This data collection from the service suppliers for the year 2011-2012. The data consists of the quantity based on purchase orders and actual quantity received at the tank storage.

4. Purchasing Order: This data can be directly accesses from ABC oracle system which represents the quantity ordered of raw materials. The data accessed is used for verifying quantity of raw materials purchased against shipment reports provided by the service suppliers. The period of data is 2011-2012.

5. Raw Material Inventory Report: This data collection from service suppliers for the year 2011-2012. The data represents the closing stock and opening stock with all the details on the movement of raw material quantity in tanks storage after it was received from the vessels and delivered to the plants.

6. Delivery Performance Report: This data recorded on the performance of each truck delivered to the plants. This report represents the quantity in trucks before and after unloading. The truck numbers and raw material quality is recorded of the test result before unloading raw materials from trucks to tank at plants. This report for

verifies the wrong trucks sent to the plants. This report can be derived from procurement department. The period of data collection is 2011-2012.

3.2 Data Analysis

The data collection has been verified and analyzed as follows.

3.2.1 The Role and Working Process Flow between Service Suppliers and ABC

The first stage describes the working process flow and responsibilities as shown in Figure 3.2. It describes the process flow of raw material procurement and delivery at plants including lead time of each process. The responsibility of the service suppliers can be mainly divide into 5 sections which is as follows.

1. Arrange Terminal for Vessel Berthing: ABC shall inform the vessel schedule to the service supplier about 15 days before the estimate time arrival date and coordinate with service suppliers for vessels schedule update so that service suppliers can plan appropriately at the port available for vessel berthing. Service suppliers would ensure that the vessel remains safely afloat during all berthing and unberthing maneuvers. If the service supplier fails on this part, and keeps the vessels waiting to berth these have higher chances of getting the demurrage charge from raw material suppliers because of the total time used of that vessel extends beyond the total time allowance of the vessel.

2. Unloading Raw Material: After vessel berthing, the service supplier must conduct the measurement, sampling and testing of raw materials in ship tanks to determine quantity and quality before unloading to and providing the results to ABC. Then raw materials are unloaded from vessel to tanks storage to check the actual quantity received in the tank storage. After that the service suppliers must provide the shipment report to ABC within 24 hours after completion of unloading. All data for shipments of the month must be provided to ABC according to a monthly basis. At this point, if service suppliers delay for unloading raw materials there is more chance

to the demurrage charge from the raw material suppliers due to the total time used of the vessel extends beyond the total time allowance of the vessel.

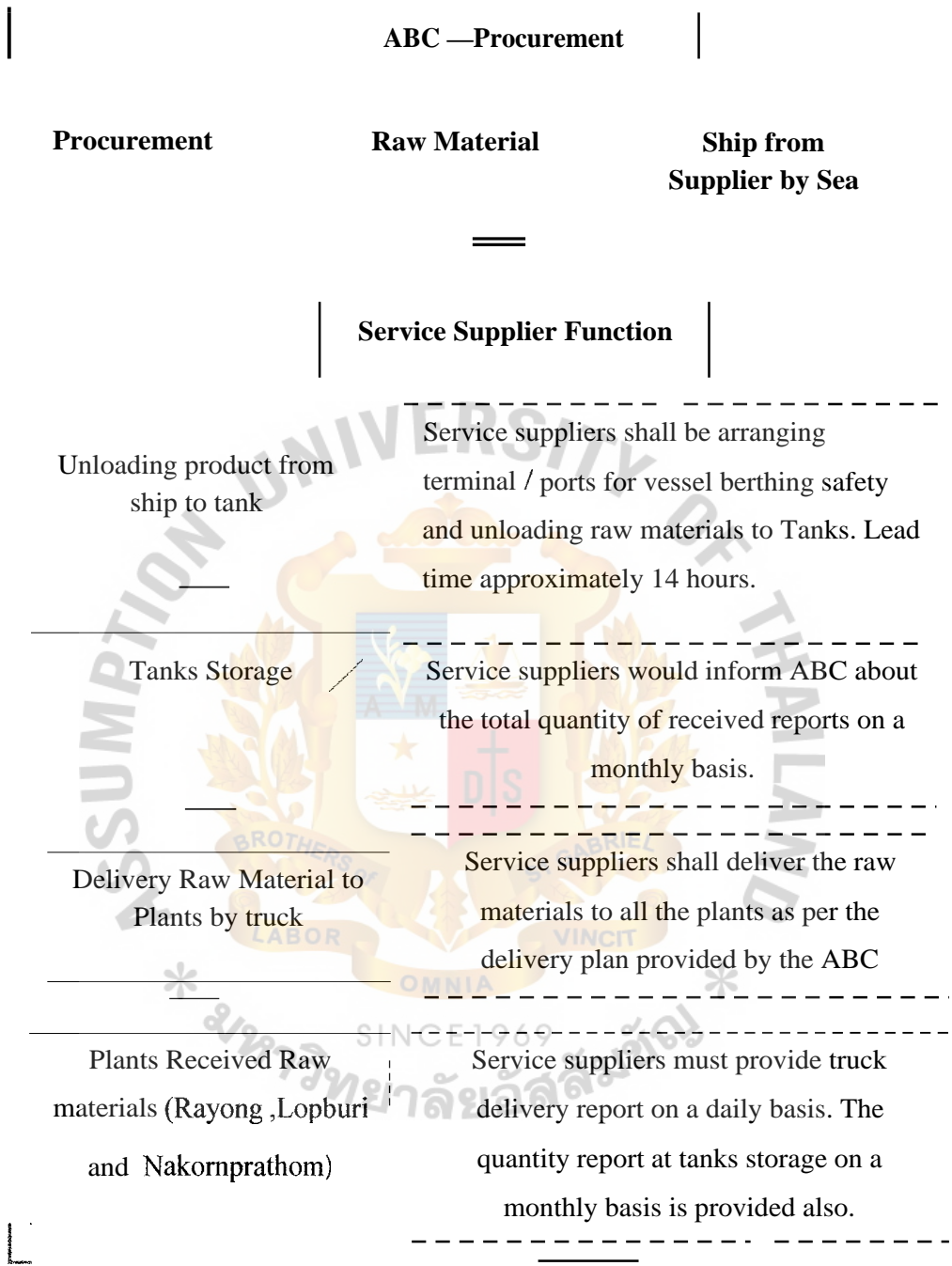
3. Delivery Raw Material to Plants: ABC shall inform and keep updates of delivery plans to the service suppliers. The service suppliers follow the plan for delivery of raw materials to the plants and provide the truck delivery report to the ABC on a daily basis.

4. Provide Relevant Reports: The service suppliers must gather all the data and provide all relevant vessel shipment reports, test result reports, inventory reports and truck delivery reports to the ABC on a monthly basis.

5. Invoice Charge and Credit/Debit Note: The service suppliers must consolidate invoices to ABC within the 5th of each month for tank rentals, operation service charges and transportation charges. This is based on unit price as settled in the quotation and actual quantity received from vessel and quantity delivered to the plants. ABC shall pay consolidate invoices amount to the service supplier's nomination bank account no later than 45 days.

Price settlement between ABC and service suppliers mentions that if the actual quantity received is over than 95,000 tons per year, the service suppliers must arrange credit notes to ABC no later than 30 days after the amount of credit note settlement.

Figure 3.2 Process Flow of Material Procurement and Transportation



Source: Author

3.2.2 Service Supplier Performance Analysis

1. Incorrect Invoice Charges Report: This report presents the amount of invoices overcharged for the year 2011-2012 in details in Table 3.1. The total amount over charged is about 1,002,105 THB. This problem occurred as a result of incorrect unit price and incorrect quality on invoices which were over the unit price settlement and actual quantity received from the vessels. For the year 2012, ABC checked and confirmed the number with service suppliers is not regularly. Therefore the incorrect invoices were reduced as data in Table 3.1 this indicates that incorrect for 2 months and in these 2 months ABC did not check, and found the invoices incorrect after payment. Also, in terms of accounting this must be 100% correct, because the problem has an impact to account assets, account payable and bookkeeping record. Moreover, the extra paperwork and the time spent communicating about the mistakes is an inconvenience for both sides.

2. Delay on Credit Note Report: The quantity received from vessels exceeds 95,000 tons per year. Service suppliers shall provide credit notes to ABC within 30 days. But for the period of the year 2011 the actual quantity received from vessel is beyond 95,000 tons. ABC found that service suppliers delayed issue credit notes to ABC for about 4 months. This problem leads to loss of opportunity of money to ABC. The credit note would be release to ABC is about 2,223,978 THB but it has delayed about four months, consider the interest from SCB bank is 2 % that means the loss of opportunity of money is 2,268,458 THB because of the interest from SCB bank is only 2%. For the year 2012 the actual received from vessel is beyond 95,000 tons also. The credit note would be release to ABC is about 2,886,141 THB but it has delayed about four months, consider the interest from SCB bank is 2 % that means the loss of opportunity of money is 2,943,864 THB.

Table 3.1 Incorrect Invoice

Year	Month	Over Charge Amount
2011	January	80,609
	February	88,249
	March	90,266
	April	78,729
	May	86,526
	Jun	93,653
	July	89,355
	August	91,031
	September	79,468
	October	66,408
	November	57,509
	December	50,831
	Total Over Charge 2011	952,635
2012	January	32,789
	February	-
	March	-
	April	-
	May	16,681
	Jun	-
	July	-
	August	-
	September	-
	October	-
	November	-
	December	-
	Total Over Charge 2012	49,470
Grand Total Over Charge 2011 and 2012		1,002,105

Source: ABC Company

3. Shortage of Raw Material: Table 3.2 presents the shortage of raw materials which occurred during storage in tanks, for delivery of raw material to ABC manufacturing. The shortage amount is about 860,751.51 THB or 89% of the average landed cost for the year 2011. For the year 2012 the shortage amount is about 1,136,460 THB or 87% of average landed cost. As the result, the amount of loss for the year 2012 is increase by 32 % compared with amount of loss for the year 2011. This report presents that the service quality of service suppliers does not meet the requirements of ABC. Moreover, service suppliers failure of perfect performance lead to the additional cost.

Table 3.2 Shortage of the Raw Materials

Month	Quantity Shortage (Ton)	Average Raw Material Cost (THB/Ton)	Average Landed Cost (FHB/Ton)	% Loss Compared with Average Landed Cost	Total Amount of Loss (THB)
January	-	-	-	-	-
February	-	-	-	-	-
March	-	-	-	-	-
April	-	-	-	-	-
May	-	-	-	-	-
Jun	-	-	-	-	-
July	8.53	35,557	40,102	89%	303,123.85
August	-	-	-	-	-
September	7.35	37,905	42,450	89%	278,717.67
October	5.04	34,997	39,542	89%	176,382.36
November	2.71	37,875	42,420	89%	102,527.63
December	-	-	-	-	-
Total 2011	23.63	36,583	41,128.46	89%	860,751.51
January	4.00	38,750	44,950	86%	155,000.00
February	-	-	-	-	-
March	-	-	-	-	-
April	6.00	41,230	47,430	87%	247,380.00
May	7.00	41,540	47,740	87%	290,780.00
Jun	-	-	-	-	-
July	-	-	-	-	-
August	-	-	-	-	-
September	10.00	44,330	50,530	88%	443,300.00
October	-	-	-	-	-
November	-	-	-	-	-
December	-	-	-	-	-
Total 2012	27.00	41,463	47,663	87%	1,136,460.00

Source: ABC data

4. Demurrage Penalty Charges: According to the agreement between ABC and the raw material suppliers, the unloading of raw materials from the vessel to tanks within the time allowance of each vessel is specified. If the total of time used extends beyond the time allowance, the ABC has to pay the demurrage penalty charge to the raw material suppliers. This report presents the performance of service suppliers during

vessel berthing and unloading of raw materials to the tanks. The root cause this problem arises from the service supplier failure to perfect performance to prepare the port available for vessel berthing. Delays on operations with regard to unloading the raw materials from vessel to tanks occur. This problem leads ABC to faces with the additional cost paid to raw material suppliers which is a total of 1,615,833 THB or 3% of total service supplier cost for the year 2011. The highest demurrage penalty in March 2011 was about 515,100 THB or 6% of total service supplier cost. For the year 2012 the demurrage penalty is about 265,674THB or 3% of total service supplier cost as shown in Table 3.3. For the year 2011, the demurrage charge was about 9 vessels from a total of 24 vessels which is approximately 38%. For the year 2012, the demurrage charge was about 2 vessels from a total of 20 vessels which is approximately 10%.

In the year 2012, ABC sent staff to the port during the vessel berthing and unloading of raw materials to tanks for monitoring, therefore the demurrage were reduced during year 2012. But this does not occur regularly and this is not the right way to solve this problem. That means if ABC did not send staff to the port for monitoring this problem there could be increasing again. ABC management does not accept as recovery and the extra transportation cost increases because of demurrage penalty. Therefore the demurrage penalty should be zero.

In summary the data analysis on the performance of service suppliers, found that service suppliers do not meet certain service levels of expectations. Other than that all problems have potential to reoccur in the future. Without the service level agreement customers just receive only promises that the problems will not occurs again.

Table 33 Demurrage Penalty Charge

Year	Month	Demurrage Charge (TM)	Total Service Supplier Cost (TUB)	% of Service Supplier Cost
2011	January	262,393	8,525,740	3%
	February	292,921	9,357,002	3%
	March	515,100	9,085,122	6%
	April	-	-	-
	May	-	-	-
	June	306,678	9,854,192	3%
	July	238,741	9,921,313	2%
	August	-	-	-
	September	-	-	-
	October	-	-	-
	November	-	-	-
	December	-	-	-
Total Amount 2011		1,615,833	46,743,370	3%
2012	January	-	-	-
	February	-	-	-
	March	-	-	-
	April	-	-	-
	May	-	-	-
	June	-	-	-
	July	-	-	-
	August	-	-	-
	September	-	-	-
	October	265,674	10,165,847	3%
	November	-	-	-
	December	-	-	-
Total Amount 2012		265,674	10,165,847	3%
Grand Total Amount		1,881,508	56,909,217	6%

Source: ABC data

3.3 Identifying the Criteria of Service Level Agreement

This section states in the commitment phase of service level agreement process as shown in Figure 3.3 and identifies the criteria of service level agreement. From the data analysis of service supplier's performance, the researcher analyzed that there are 4 items that shows primarily be requested as the criteria of service level agreement.

This is 1) incorrect invoice charge, 2) delay on credit notes, 3) shortage of raw materials, 4) demurrage penalty charges.

The procedures to identifying the criteria of service level agreement consist of 4 steps which are as follows.

3.3.1 Discussion with the Procurement Teams: The procurement teams are the persons in charge who directly cooperation with the service suppliers. Meetings are conduct to discuss the criteria of service level agreements as mentioned above to clearly understand the criteria. If these are some addition comments from the procurement teams, the criteria are revised and discuss again for finalization.

3.2.2 Obtain approval from the managing director: The approval from managing director should be given at the final stage internally before the criteria of service level agreement are sent to service suppliers.

3.3.3 Identify the Criteria of service level agreement: ABC should identify the requirements and indentify the criteria of service level agreement. The researcher too identifies the criteria of service level agreement based on data collection and data analysis which is as follows.

- I. **Unreliable Documents - Consolidated invoice accuracy:** Presently ABC faces overcharge from service suppliers, and this is needs to be state in the criteria of service level agreement. The invoice charge should have 100% accuracy, with no discrepancy of both of unit price and quantity. If the service suppliers fail on this function and overcharge and ABC already paid in full amount, the service supplier would provide credit notes to ABC including the interest of money.
2. **Credit Note Release:** The second problem is service suppliers delay on release of credit notes. Credit notes must be provided to ABC on time. That means service suppliers would arrange credit note to ABC no later than 30

days after the amount is settled. The service suppliers fail on this function by delaying to release credit notes; the service suppliers would be responsible for an interest of money which is the same as with time delayed.

3. Service Performance – Raw material loss guarantee: The service supplier must warrant that they undertake to control the overall process of their operations to ensure that there is no shortage that occurs during tank storage and transportation. The service suppliers fail on this criterion, the service suppliers would be responsible for the full amount of raw material shortage.

4. Service Performance - Availability of port and ready to unloading raw material: The service supplier must warrant that the port would be available when the vessel has arrived at the port and is ready to unloading raw materials from the vessel to tank storage, to avoid the demurrage penalty. If service suppliers failure on this function, the service suppliers would be responsible for the demurrage penalty charges.

3.3.4 Dispute Procedure: Any dispute arising or relating to the above criteria of service level agreement must be settled for both sides accordingly_

1. Discussions and Meetings: To settle disputes, both sides must discuss and have meetings to better understanding and find out the resolution together by agreement. The dispute arises from penalty; data measurement for both sides must be reconsidered.

2. Investigation and declare data: To clearly understand, both sides must investigate and declare data or tracking performance for reference and cross checking this should be finalized with mutually.

3. Finalization for both sides must be written clearly.

3.4 Verification the Criteria of Service Level Agreement

To determine whether the criteria of service level agreements are being met the needs and expectations are sent to ABC in order for implementation. The parameter proposed to verify the criteria of service level agreement is as follows.

1. **Reasonable:** The criteria of service level agreement should be mutual for both sides. This is interaction between ABC and the service suppliers.
2. **Measurable:** The criteria of service level agreement should be measurable and data can be controlled, record and monitor for the service suppliers performance. The invoice charge can be measured by the monthly invoices received which are recorded from finance. If nothing is issued it means there are correct invoices submitted.
3. **Attainable:** The service level agreement should be attainable. It is create any no benefits for both sides if the inappropriate of the service level agreement is identified.
4. **Enforceable:** The service suppliers performance improvement, supplier relationship and cost saving are importance for ABC. Thus, the service level agreement must be clearly understood by both sides to be enforced by ABC.

After verification of the service level agreement with procurement teams and discussed with managing directors, the decision as to whether the service level agreement is appropriate to implement is finalized.

3.5 Setting up Regulations the Criteria of Service Level Agreement

Regulations of the criteria of service level agreement are stated in the preparation phase. Figure 3.3 shows the service level agreement process. Communication from

management again in term of approval on the regulations set up is needed, before it is sent to the service suppliers.

The result of consideration of the criteria of service level agreement, should improve the performance of service suppliers and maximum margin by minimizing cost and reducing cost in the supply side by applying the service level agreement strategy. Therefore the regulations for implementation of the criteria service level agreement are set up as follows.

- 1. Commitment:** In the first step official commitment for the regulations set up based on criteria of service level agreement from management is needed in order to get the support and to get the whole organization to realize the importance and treat this as on priority. Then teams to carry out and response on the whole process are established.

Figure 3.3: Service Level Agreement Process



Source: Miles et al. (2007)

- 2. Preparation and Setting of up the Regulations:** Meeting is conducted and discussion with members of the teams to clearly understand the criteria of service level agreement and determine in the other factors that effect to service quality is needed. Also create a regulation set up to send to service suppliers for discussion in the next process. Also plan to monitor services after implementation in order to convince service suppliers to agree on the list of the service level agreement.

3.6 Provide the Set up Regulation of Service Level Agreement to Service Suppliers and Initiate Negotiation

The criteria of service level agreement directly concerns with service suppliers, therefore the criteria of service level agreement to service suppliers for review and accept on the criteria as ABC identified. If the service suppliers do not agree with some items or would like to negotiate on the service level, a meeting to mutually agree on the criteria of service level agreement for both sides is considered.

3.7. Final Review

Review the criteria of service level agreement as the final stage after discussion with the service suppliers. A meeting with procurement teams to understand the final service level agreement and report the final service level agreement the managing director before implementation is needed.

3.8 Implementation of the Criteria of Service Level Agreement

1. Negotiation: In this process ABC would create the draft of service level agreement with the specified criteria of service level agreement and relevant terms and conditions. Then the meeting with service suppliers, discussion and finalization of the service level agreement is conducted. After both sides agreed above all of the service level agreement, terms and conditions, two copies of the agreement for both sides would to sign are prepared. Each side will keep one copy for official service level agreement reference.

2. Management: After signing on the agreement, the criteria of service level agreement must be implemented. A system for measuring service suppliers performance are monitored on reports, invoices and credit notes. This is done to find out whether the conditions on service level agreement are met. If some items do not meet the expectations the service suppliers are informed and a meeting is set up if required.

If in case of any failure of performance by the service providers, other than the existing criteria of service level, a discussion with member teams and service suppliers is set up. The list of service level into the agreement is amended.

After implementation of the service level agreement reduction of logistic cost, reduction of cost in the supply side is needed. Improvement of performance of service suppliers increases as well. Moreover, relationship with suppliers gets better.

3.9 Summary

This chapter describes the research methodology, which proposes the criteria of service level agreement by using the service level agreement strategy. The results of this study will be reduce the logistic costs and improve the service suppliers performance. This is presented in the next chapter.



CHAPTER IV

PRESENTATION AND CRITICAL DISCUSSION OF RESULTS

This chapter presents the set up regulations to implement the service level agreement according to the criteria stated in the previous chapter and to verify the service level agreement. The objective of this chapter is to set up the regulations based on the criteria of service level agreement and consider the results of service level agreement to reduce the logistic costs, reduce costs, improve performance of service suppliers and develop relationship with suppliers.

4.1 Proposed Service Level Agreement

The proposed service level agreement aims to specify the level of service required by ABC. The service level agreement proposed is in accordance with the 4 problems that ABC faces. This arises from the results of the meeting with the procurement teams. The approval of the managing director is needed. The proposed service levels are as follows;

4.1.1 Service Level Agreement for Unreliable Documents: The problem is that the service suppliers provide incorrect invoices. The prospective of service level is invoices from service suppliers should have 100% accuracy.

4.1.2 Service Level Agreement for Delays on Credit Notes: The problem is service supplier delays on credit notes. Based on quotations between ABC and service suppliers for the cumulative quantity discounts, the service suppliers offer 3% discount if total quantity received from the vessels exceeds 95,000 tons during a one year period. Therefore, the proposed service level reduced and show 3% discount on the invoice once ABC achieved 95,000 tons. There is no need to wait for completely one year to release credit notes.

4.1.3 Service Level Agreement for Material Shortage: The problem is shortage of raw materials. The shortage of raw materials occurs during storage in tanks and activities to deliver raw materials to ABC manufacturing. Therefore, the proposed service level is agrees on no shortage of raw materials.

4.1.4 Service Level Agreement for Demurrage Penalty Charge: The problem is demurrage penalty charges arising from service supplier failure to perfect performance to prepare the port available for vessel berthing. Therefore, the proposed service level agrees on no demurrage penalty charges.

Table 4.1: Proposed Service Level Agreement

Problems	Proposed Service Level Agreement
Incorrect Invoice	Invoice would be 100% accuracy.
Delay on credit Note Report	Once 95,000 tons is achieved, invoice would reflect 3% discount
Shortage of Raw Material	No shortage of Raw materials
Demurrage Penalty Charge	No Demurrage penalty

Note: Quantity received 95,000 tons per year to be the promised KPI with service suppliers.

Source: Author

4.2 Set up the Regulation of Service Level Agreement

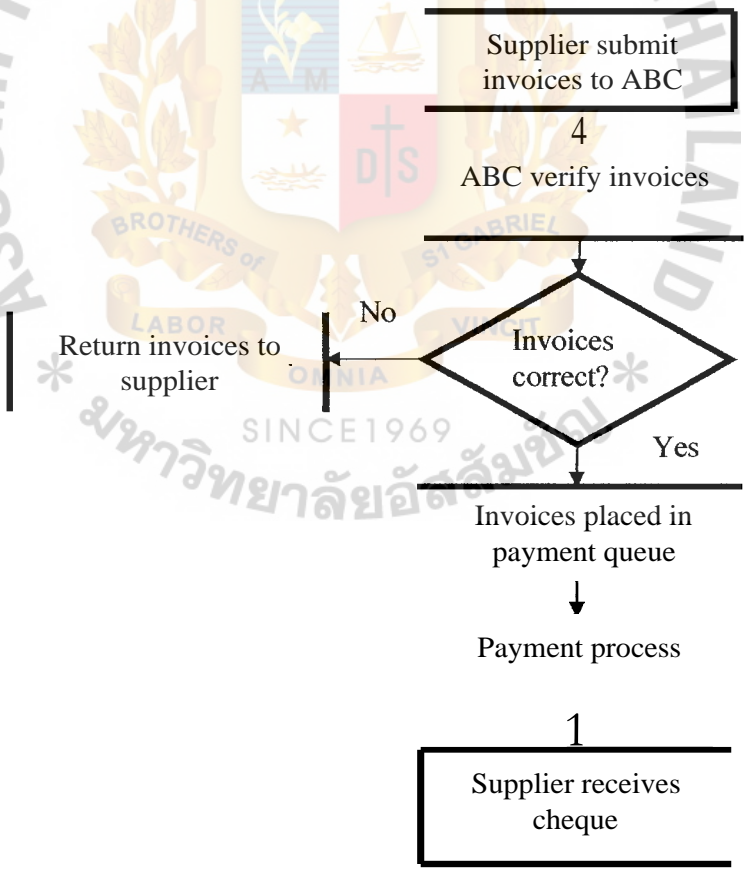
In accordance to the 4 criteria proposed of service level mentioned above. The next process is to set up the regulations of service level agreement. This presents the current process and proposal regulations as per the results after discussion with the procurement teams and receiving the approval from the managing director. The regulations for service level agreement are as follows.

4.2.1 Set up Regulations of Service Level Agreement for Unreliable Documents

The incorrect invoices from the service suppliers can be classify into 2 types. These are operation service charges and logistic charges for delivery of raw materials to plants. As a result, mostly quantity on invoices does not match with actual the quantity.

Currently, service suppliers provide consolidated invoices and submit it to ABC once a month. The invoice includes all the shipments during of a one-month period. ABC verifies the quantity on invoice against the actual quantity received from vessels and verifies the unit price against quotation. Figure 4.1 shows the current invoice and payment process.

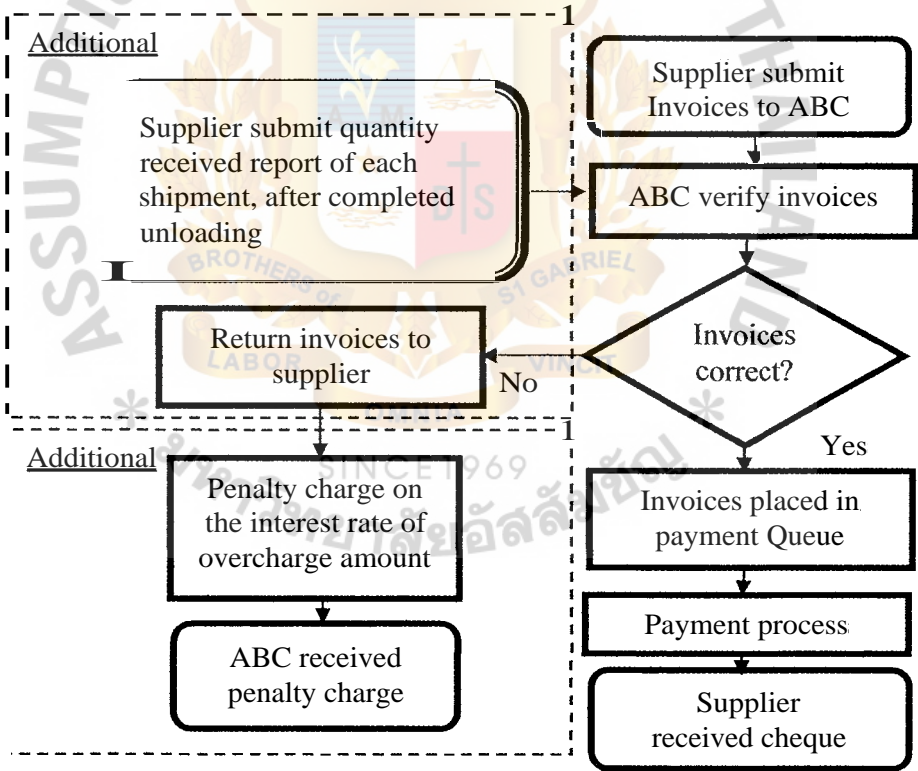
Figure 4.1: Current Invoices and Payment Process



Source: Author

As per the internal discussion, the service level would set up the process to request the service suppliers to provide the report of quantity received once the raw materials from the vessels to tanks for every shipment have been unloaded. This is to cross reference check and investigation if the quantity discrepancy that occurs with supplier's invoice. Figure 4.2 presents the new process of invoices and the payment process. If the service suppliers provide incorrect invoice by overcharging, it would be subject to penalty and charged on the interest of money which is the same as overcharged amount. The interest rate applied will be the on the maximum interest rate announce on the website of SCB Bank. This is to improve accuracy and speed while reducing the overhead of accounts payable by decreasing the time spent on checking data.

Figure 4.2: Proposal Invoices and Payment Process

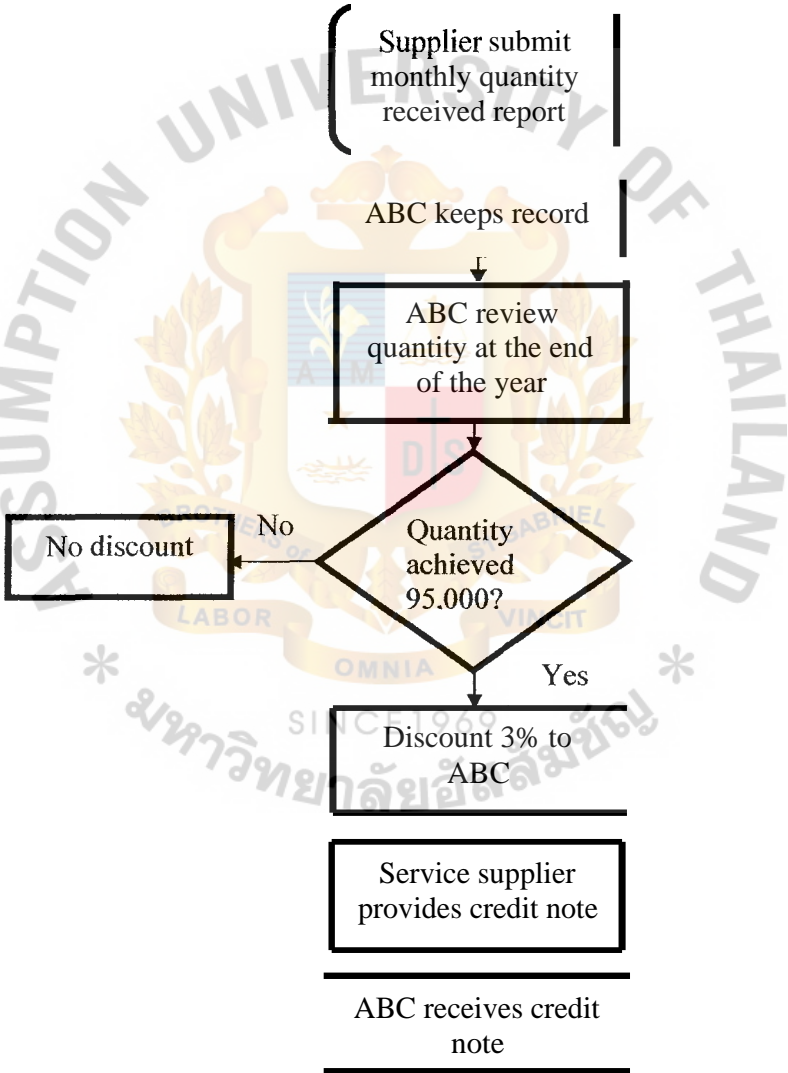


Source: Author

4.2.2 Set up Regulation of Service Level Agreement for Delay on Credit Note

Currently, ABC faces delays from the service suppliers to release credit notes about 4 months after the credit note amount is settled. Once ABC achieves quantity of 95,000 tons, service suppliers provides 3% reduction on price by credit notes to ABC. Figure 4.3 presents the current credit note process.

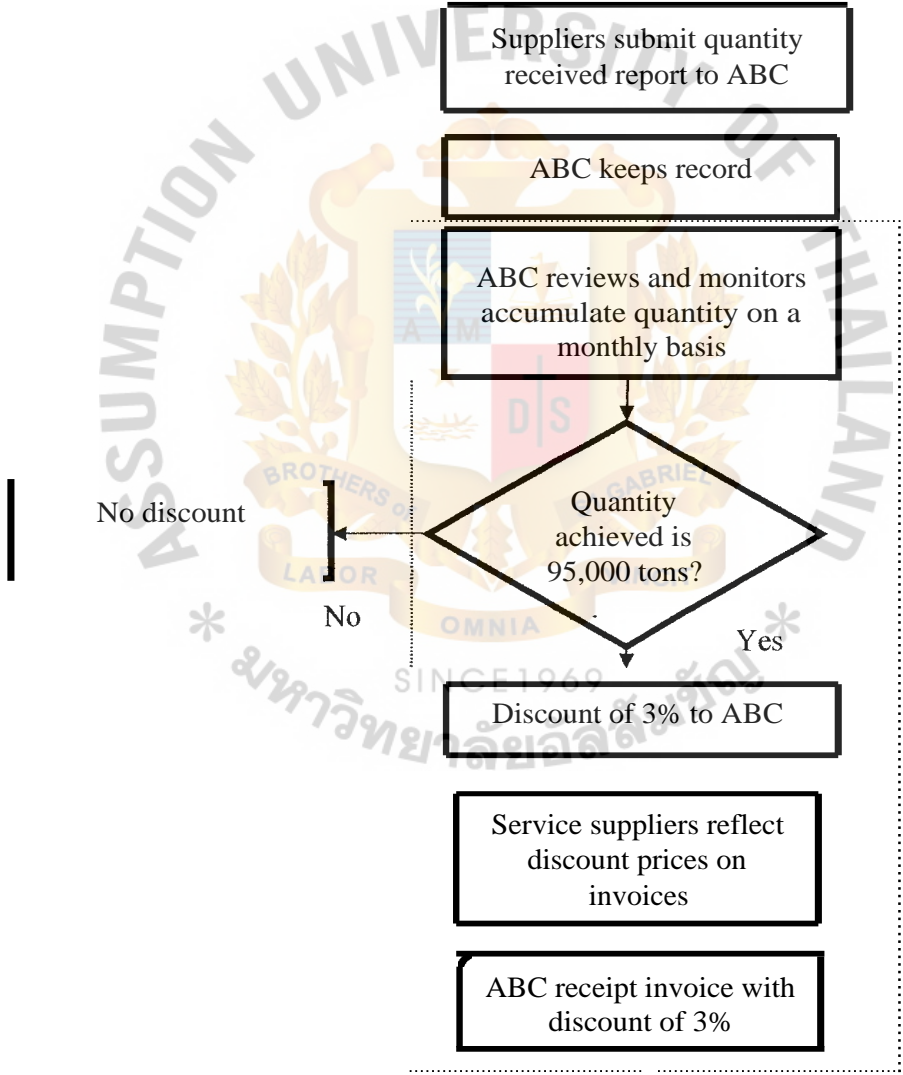
Figure 4.3: Current Credit Note Process



Source: Author

Therefore, the regulation would be set based on the service level agreement to adjust unit price on invoices after achieving 95,000 tons. ABC would periodically review or the supplier should review and give 3% discount automatically cumulative quantity for every shipment. The service suppliers should periodically review and inform ABC if the quantity achieved is 95,000 tons. The service suppliers would reflect the new price with on discount of 3% on the invoice instead of providing credit notes as figure 4.4 shows.

Figure 4.4: Proposal for Credit Note Process



Source: Author

In the regulation set up above presents that there eliminating the process to release credit notes saves time for both sides.

4.2.3 Set up Regulation of Service Level Agreement for Material Shortage

This problem occurs when raw materials stored in tanks are too less or when raw materials are unable to be delivered by trucks to ABC manufacturing plant. The formula for the shortage is as follows.

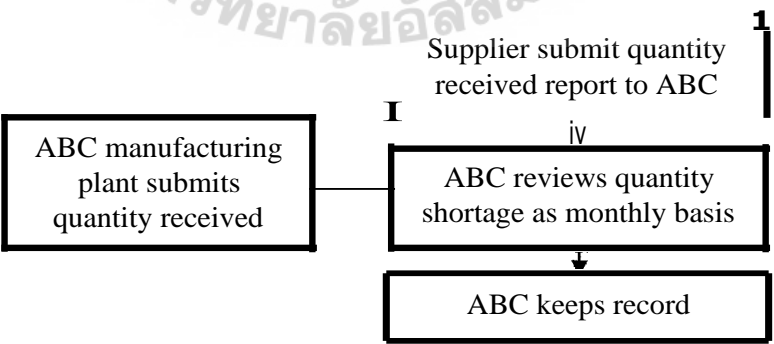
Raw material shortage = Quantity Received - (Quantity delivered to manufacturing + Quantity storage in tanks)

Example: Quantity received 1000 tons, service supplier delivered to ABC manufacturing is 500 tons. The remaining quantity in the tank is 490 tons. Therefore, shortage is 10 tons as indicated in following calculation.

Raw material shortage = 1,000- (500 + 490)
= 10 tons.

Currently, ABC receives the monthly quantity report from the service suppliers, and also receives a report from manufacturing directly. ABC reviews and verifies the raw material shortage shown as Figure 4.5.

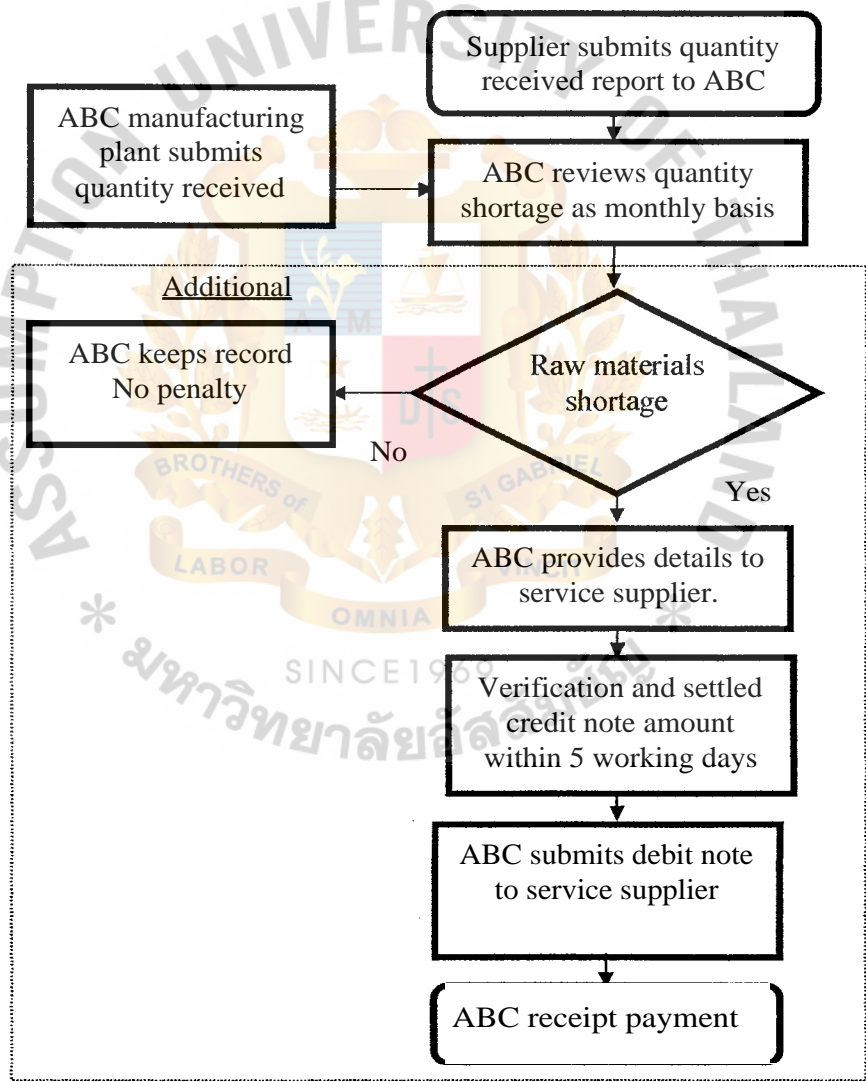
Figure 4.5: Current Shortage of Raw Material Review Process



Source: Author

As the internal discussion, sets up the regulation of raw material shortage and service suppliers increased respond with the full amount of raw material shortage. The shortage calculation will be settled on a monthly basis. If any shortage occurs, ABC would submit the shortage calculation and all the details to the service suppliers. The shortage would be settled within 5 working days after verifying all facts between the service suppliers and ABC. After that ABC would submit debit notes to service suppliers. All this is presented in Figure 4.6.

Figure 4.6: Proposal for Shortage of Raw Material Review Process



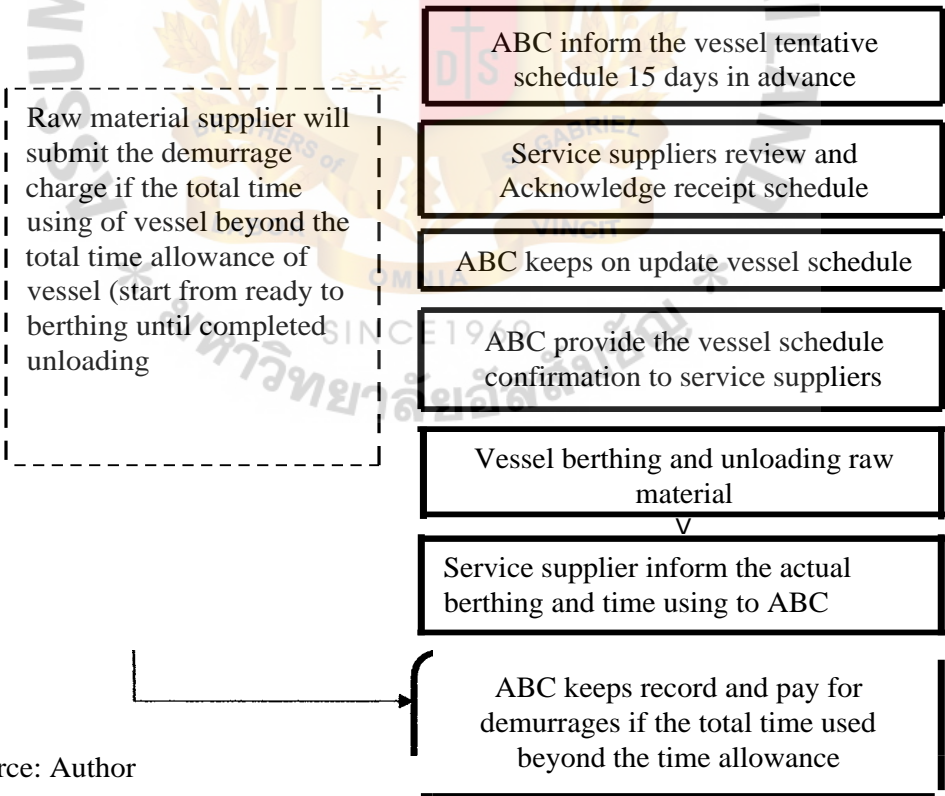
Source: Author

4.2.4 Set up Regulation of Service Level Agreement for Demurrage Penalty Charge

This problem arises when service suppliers fails to manage the port available for vessel berthing. The service suppliers keep the vessel waiting and this affects the total time which exceeds beyond the total time allowance of the vessel.

Currently, ABC would inform the vessel schedule to each service supplier about 15 days in prior to the arrival date. The service suppliers are updated on vessel schedules everyday till the actual date of arrival. Once the vessel berth and unloading is completed, the service suppliers will provide the actual berthing time report to ABC. ABC keeps a record and calculates the total time used for each vessel to consider the demurrage. If the total time used exceeds the total time allowance, ABC would response on the demurrage charge as presented in the Figure 4.7.

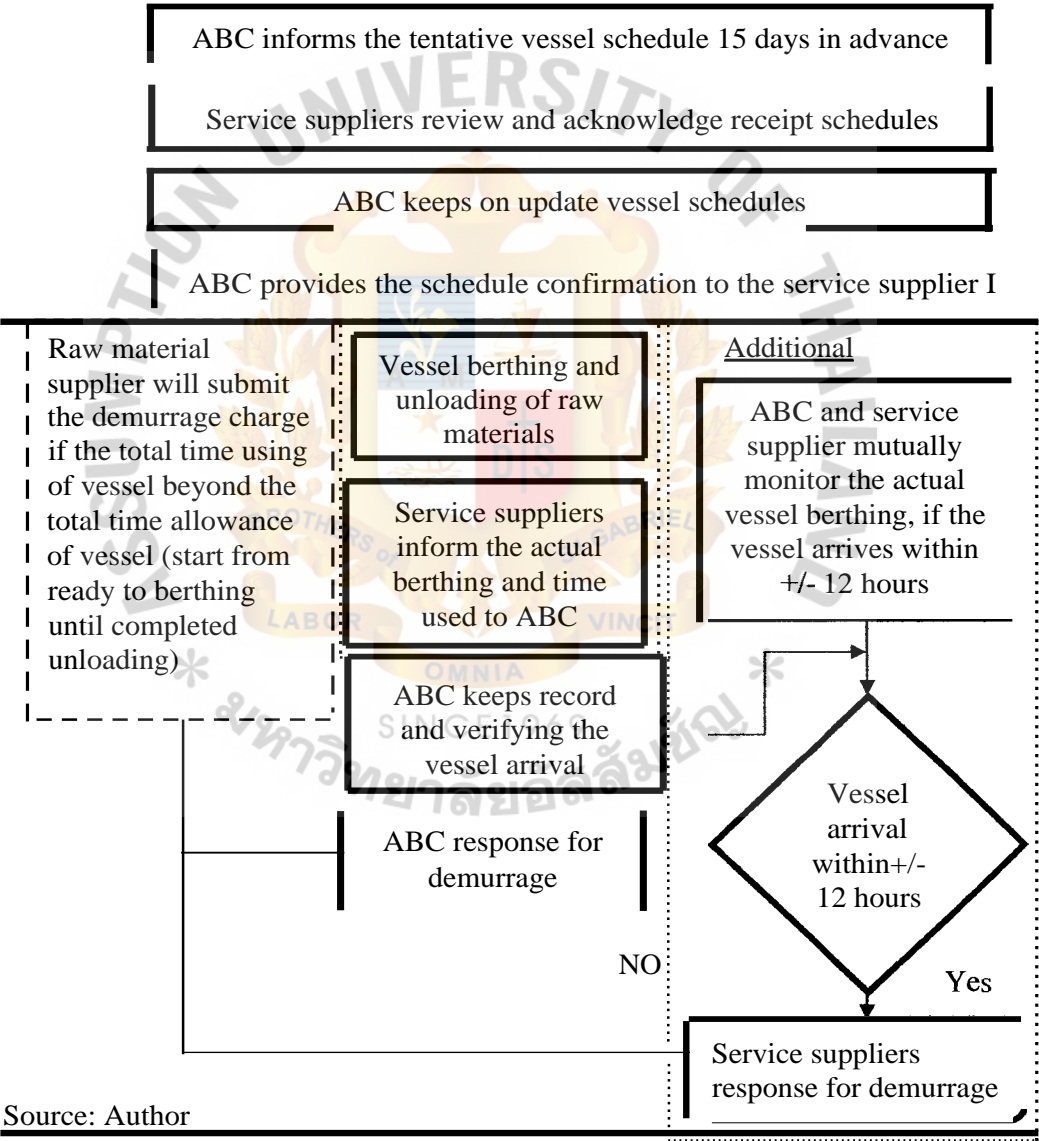
Figure 4.7: Current Demurrage Penalty Review Process



Source: Author

Internal discussions, service level agreement must set up regulations to request the service suppliers to respond on the demurrage penalty. Service supplier must respond to manage ports for vessel berthing within + / - 12 hours after receiving the confirmation of schedule from ABC. If the service suppliers fail, the service suppliers must respond above the amount of demurrage to be allocated as indicated in Figure 4.8.

Figure 4.8: Proposal for Demurrage Penalty Review Process



4.3 Provide the Set up Regulation of Service Level Agreement to the Service Suppliers and Initiate Negotiation

After setting up the regulations of service level agreement, the next process for ABC is to provide the service level to service suppliers for review and negotiation with the service supplier. The results after proposing the regulation set up and negotiation with the service suppliers are as follows.

4.3.1 Regulation of Service Level Agreement for Unreliable of Document: Incorrect Invoices

After discussion with the service suppliers, the service supplier agreed on the service level proposed by ABC. The service supplier accepted that the root cause of incorrect invoices arise from incorrect specified quantity. The service supplier accepted the regulations set up for incorrect invoice as mentioned above. The service supplier must provide the report of quantity received once unloading raw materials from vessel to tanks for every shipment is completed.

4.3.2 Regulation of Service Level Agreement for Delay on Credit Note

After discussion with the service suppliers, the service suppliers accepted the regulations of service level proposed by ABC. There are mutually agreed on the quantity accumulation. Once quantity achieved is 95,000 tons, the service suppliers would provide 3% reduction price on the invoice automatically. This reduces many processes for preparing and releasing credit notes.

4.3.3 Regulation of Service Level Agreement for Material Shortage

After discussion with the service supplier, the service supplier agreed on the regulations set up for raw material shortage. The service suppliers would warranty that there is no shortage occurs during storage in tanks and delivery to manufacturing.

In case shortage occurs, the service suppliers are fully responsible for the amount of shortage. The shortage of raw material calculation based on formula is as follows.

Raw material shortage = Quantity Received - (Quantity delivered to manufacturing + Quantity storage in tanks)

The shortage would be settled within 5 working days after verification, investigation and confirmation of the amount of shortage. This is given in writing by both sides.

4.3.4 Regulation of Service Level Agreement for Demurrage Penalty Charges

After discussion with the service supplier, the service supplier partly agreed on the regulation of demurrage penalty charge. The service suppliers agreed on the regulation set up except about the vessel arrival delay or earlier within 12 hours after receiving the vessel schedule confirmation. The service suppliers negotiate to reduce this from 12 hours to 6 hours. ABC would come to discuss this later internally.

4.4 Final Review

This section, presents the results of final review after negotiation with service suppliers. This is to confirm the service level agreement and provide the service level monitoring and performance measures.

4.4.1 Results of the Final Review

After discussion with the procurement teams and managing director on the negotiation results, the service supplier agreed on the regulation set up for incorrect invoices, delay on credit notes and shortage of raw materials, but did not accept the proposal of set up regulation for demurrage penalty charge. The service supplier preferred the option of vessel arrival within 6 hours, instead of 12 hours.

The outcome of the final review from the procurement teams and managing directors are as follows.

1. Service Level Agreement for Unreliable of Document: Incorrect Invoice: ABC agreed on the regulations set up for incorrect invoice which enable ABC to gain implemented. This is to reduce and eliminate the incorrect invoice problems.

2. Service Level Agreement for Delay on Credit Notes: The service suppliers agreed on the regulations set up to produce an invoice for 3% discount instead of credit notes. Therefore, ABC can eliminate the delay that occur credit notes become of .The support and cooperation for both sides is needed.

3. Service Level Agreement for Shortage of Raw Material: The service suppliers agreed on the regulations set up to respond on the amount of raw materials. There can adequate processes to handle and resolve this problem. Therefore, ABC agreed on this service level.

4. Service Level Agreement for Demurrage Penalty Charge: The service suppliers negotiate to reduce the time of vessel arrival to +1- 6 hours. The demurrage occurs, and the vessels are delayed for +1- 6 hours after receiving the vessel schedule confirmation, the service suppliers would respond to the demurrage penalty. It could be better for preventive solutions to reduce reoccurrence of demurrage problems. Thus, ABC agreed on this service level.

4.4.2 Service Level Monitoring and Performance Measures: The service level for monitoring and performance are as follows

1. Monitoring and Performance Measures for Invoices are incorrect: There is monitoring based on the regulations set up and agreed to by both sides. Performance is measured from comparisons between quantity on invoice and quantity report received from service suppliers.

2. Monitoring and Performance Measures for delay on credit notes: There is monitoring based on the regulations set up and agreed to by both sides. The performance measured from the invoice reflects 3% reduction price once quantity achieved is 95,000 tons.

3. Monitoring and Performance Measures for Shortage of Raw Materials: There is monitoring based on the regulations set up and agreed to by both sides. The performance measure from the calculation is defined in the Table 4.1. The perfect performance should have no shortage of raw materials.

4. Monitoring and Performance Measures for Demurrage Penalty: As the outcome of the final review, ABC agreed on the condition of the vessel arrival within +1- 6 hours. Thus, monitoring is based on the vessel arrival within +1- 6 hours. The perfect performance should have no demurrage penalty.

Table 4.2 presents monitoring and performance measures for all the service levels.

In terms of periodic review, the performance level once a quarter should be review. The improvement of performance level can be initiated by examining the gaps between current and targets of performance.

Table 4.2 Service Level Monitoring and Performance Measures

Service Level Agreement	Regulation Setup	Monitoring and Performance Measures	Target
Incorrect Invoice Charge	Service supplier provide quantity report every shipment after completed unloading	Measuring from invoice (Monthly basis) No discrepancy both of quantity and Unit price	Invoice 100% accuracy
Delay on credit Note Report	Reflect 3% reduction once achieved 95,000 ton	Measuring and monitoring on the quantity achieving 95,000 ton, Once achieved invoice will reflect 3% reduction price	Reflect 3% on invoice instead of credit note
Shortage of Raw Material	Penalty to service supplier. Same value of shortage of raw material	Quantity Received - (Quantity delivered to manufacturing + Quantity storage in tanks)	No shortage of raw material
Demurrage Penalty Charge	Service supplier response on the demurrage penalty. Incase vessel arrival within +1- 6 hours	Measuring from the demurrage penalty charge No demurrage charge: The vessel arrival delay or earlier within 6 hours as service supplier offering.	No demurrage penalty

Source: Author

4.5 Implementation of the New Service Level Agreement

After final review of the service levels agreement is completed. The signature and periodically reviews are required in term of efficiency and effectiveness. The implementation of the new service level agreement is as follows.

4.5.1 Negotiation and Signatures

In order to implement and effectively control on the service level agreement for both sides, it is necessary for both parties to sign the agreement. In this section a final negotiation with the service suppliers to finalize the deal is needed. Both sides arrange to sign the service level agreement on 2 copies and keep a copy each for reference.

4.5.2 Monitoring and Review

Periodic monitoring and reviews are necessary, Table 4.1 measures and tracks performance on a monthly basis. The first stage of implementation would be set up the evaluation of the service level agreements once a quarter. The result of performance as Table 4.2 indicates is gathered to find out the achievements according to the target set up.

4.6 Determine on the Result of Service Level Agreement

The implementation of service level agreement could help ABC to eliminate the future reoccurrence of loss and improves the service performance. First, eliminating the problem of incorrect invoice which creates the loss of opportunity about of one Million THB is necessary. Second, eliminating the problem of credit notes delay from service suppliers which create to the loss of opportunity about 5.2 Million THB is needed. Third, reducing and eliminating problem of raw materials shortage which creates a loss of about 1.9 Million THB is crucial. Fourth, reducing the problem from demurrage penalty charge which creates a loss of is needed about 1.8 Million THB.

In summary, for the year 2011 the implementation of service level agreement could help ABC to eliminate the loss is about 1.4 Million THB on average. For the year 2012 the implementation of service level agreement could help ABC to eliminate the loss is about 1 Million THB on average. Table 4.3 below shows all the results all of service level agreement based on the set up regulations. All amounts of four problems as Table 4.3 are referring to data presented in chapter 3. First, amount of invoice overcharge referring from Table 3.1. Second, amount of delayed issue credit notes presented in the portion of data analysis, item 2 delay on credit notes report. Third, amount of raw materials shortage referring from Table 3.3. Fourth, amount of demurrage penalty referring from Table 3.4.

Table 4.3 Results of Service Level Agreement

Criteria	Problems	Amount of Loss 2011	Amount of Loss 2012	Result of Service Level Agreement
Invoice	Overcharge	952,635	49,470	No overcharge
Credit Note Releasing	Delay on Release credit note about 4 months	2,268,458	2,943,864	No opportunity loss
Raw Material Loss Guarantee	Raw material shortage	860,752	1,136,460	No opportunity loss
Availability of Port and Readiness to Unloading Raw Material	Demurrage penalty charge	1,615,833	265,674	It is no charge since the duration is finally plus/minus 6 hours, not 12 hours as proposed
The Average amount of loss per year (THB)		1,424,419	1,098,867	Eliminate loss

Source: ABC data (Average for 2011 and 2012)

4.7 Summary

The set up regulations of the criteria of service level agreement are not only concerned with ensuring that the ABC's requirements and expectations are captured but also provides a tool for communication with the service suppliers to clearly understand the whole process. Both sides can solve the current problems and help each other.

The regulations set up of service level agreement could help ABC to eliminate the future reoccurrence of loss and improves the service performance. It can create a better understanding for both sides, by reducing time spent and create the communication about the mistakes, it also improvements the relationship between ABC and the service suppliers for the future.

CHAPTER V

SUMMARY FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

This chapter summarizes the findings, conclusions of the research results and provides recommendations.

5.1 Summary of the Findings

According to the results of data analysis, ABC currently faces with the problems of unreliable documents - incorrect invoices, delay on credit notes, shortage of raw materials and demurrage penalty. ABC proposed the set up regulations to solve these problems which are as follows.

1. Set up regulations of service level agreement for unreliable documents: This is set up to solve the problem of incorrect invoice. Service suppliers are requested to provide the quantity received and report about every shipment after completing unloading. This is for cross reference checking for both sides. If the service supplier provides the incorrect invoice by overcharging, it would be subject to penalty charges on the interest of money which is the same as overcharge amount.
2. Set up regulations of service level agreement for delay on credit notes: There is a set of the regulations to reflect 3% discount on invoices after achieving 95,000 tons instead of providing credit note. ABC would periodic review of the cumulative quantity for every shipment.
3. Set up regulations of service level agreement for material shortages: The service suppliers would response on the full amount of raw material shortages. The shortage must be settled within 5 working days after verifying all facts from both sides that is the service suppliers and ABC. After that ABC would submit the debit notes to service suppliers.

4. Set up regulations of service level agreement for demurrage penalty charges:

The service suppliers would response on the demurrage penalty. The service suppliers would be fully responsible for managing port available for vessel berthing within + / - 12 hours after receiving the confirmation schedules from ABC.

The set up regulations were discussed internally. After that, ABC provides all the set up regulation of service level agreement to the service supplier and negotiates.

The result from negotiation with the service suppliers shows that the service suppliers was agreed for all proposal regulations set up, except the regulation for demurrage penalty. There is negotiate to reduce the time of arrival of the vessel from +/- 12 hours to be +/- 6 hours.

Finally, ABC reviews the negotiation result and also agreed for all the regulations set up, including demurrage penalty as the service supplier requested. All of the regulations set up are reasonable, measurable, attainable and enforceable.

The set up regulations and implementation of service level agreement provides an opportunity for gain in the future. It can reduce and eliminating the reoccurrence loss for company in the future. The regulation set up are accepted and signed by both sides.

5.2 Conclusions

The purposes of this research to identify the criteria of service level agreement set up the regulations and implementation. The researcher recommends the implementation of the service level agreement for a short term which is three months. A three monthly review of performance level against the target is set out. If the performance level is improves, the process can be implemented in the long term.

Moreover, identify the criteria of service level agreement is the first aspect of service level agreement which is likely to add value since it compels internal determination what of service level really needs. Therefore, service trends should be reviewed carefully after identify the criteria of service levels and obtaining the approval from the top management.

5.3 Theoretical Implications

This research has exploited mainly of service level agreement implementation strategy by Miles et al. (2007). This is intends to introduce the concept of service level agreement, provides guidance on service level agreement process and implementation.

In term of knowledge, this research has generated to the field of the service level agreement in a petrochemical industry. It is follows the service level agreement strategy by Miles et al. (2007). By studying the service level agreement in the petrochemical industry this research provides valuable into scope of identify the criteria, setting up regulations and implementation of the service level agreement.

Therefore, other researchers and students who look for knowledge of implementing the service level agreement can use this research as guidance.

5.4 Managerial Implications

The managerial implications of this research are primarily for the petrochemical industry. No other firm in the petrochemical industry has done this before. The service level agreement is divided into the difference levels. Each level addresses difference sets of business requirements. The same business has mostly the same service requirements.

The purposes of this research are identification of the criteria of service level agreements, setting up the regulation, and implementation based on service level

agreement strategy. The procurement teams can find more methods to solve the current problems. The results of this research model can be applied to the real world. Other companies, in the petrochemical industries can consider applying this research to improve service performance and develop supplier relationship.

Initially, it is importance to identify the minimum acceptable service level. Then setup regulations and monitor the process to ensure that the agreed levels are being met. Therefore, before implementation the service level agreement strategies should consider all issues relevant with the business requirement and study the advantages and disadvantages. The implementation of service levels without understanding leads to failure of service level agreement strategy.

5.5 Limitations and Recommendations for Future Research

This study focuses on the improvement and develops performance and relationships with service suppliers by using service level strategy. The criteria of service level agreements are identified. There are some limitations. First, is the limitation of time, the researcher considered the historical data for 2 years which are 2011 and 2012. Second, the final price of raw material could not be used in this research because this is confidential; therefore raw material cost is calculated based on Asian market price in the average or percentage. Third, the PET production process is confidential; therefore the researcher presents only the overall picture of the PET production process.

The recommendation of the future research is to expand the period of data analysis to more than 2 years. If data is gathered for more than 2 years, it is good to identify the criteria of service level agreement. This is to provide opportunities to seek for other losses that may occur from the service suppliers.

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