



A CASE STUDY OF APPLYING SUPPLIER EVALUATION AND
SELECTION IN BUYER SOURCING: A THAILAND GARMENT
COMPANY

By
SASINAN THANAWARITANAN

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

ABAC School of Management
Assumption University
Bangkok, Thailand

April 2008

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‘A Case Study of Applying Supplier Evaluation and Selection in Buyer Sourcing: A Thailand Garment Company’

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Assumption University

April 2008

Abstract – This project is a case study to apply a supplier evaluation and selection model to the buyer sourcing in a garment company in Thailand (ABC Company). Supply is an integral part of a supply chain. Suppliers have to be selected carefully, as they can have a very positive or a very adverse impact on the overall performance of the organization. Currently, the company selects its suppliers by experience; the company lacks a method to support these judgments. Moreover, ABC Company is facing several problems which come from the suppliers such as quality, lead time of development and cost.

Based on the supply base management concept in terms of supplier relationships, this concept can be linked with the ideas of relationship and performance. To have a close relationship with suppliers, can lead to benefits and help to increase the company's performance. Moreover, the number of suppliers in the supply base is the one important issue, and their condition and qualification has to become the best. Van Weele (2000, p.144) claims that the issue of “what conditions and qualifications the best-in-class suppliers should meet” is an important question in supply base management, thus highlighting management of supply performance as a key issue. The supplier evaluation and selection method should be adapted to the company for finding the right suppliers so that the company can build the relationship at a strategic level rather than just a transactional level. The methodology in this case study for collecting the data and information is a mixed approach. The data collection involves capturing numeric as well as textual information. In other words, both quantitative and qualitative methods are employed. To select the method of supplier evaluation and evaluation, several studies were reviewed, for this case study, and the model of Teng and Jaramillo (2005) was selected for simulation. There are 267 existing suppliers of

the ABC Company, divided into fabric suppliers, accessories, sub-contract (embroidery and printing), finished goods and sub-contract (finished goods). The greatest spending cost is the fabric category as 50 percent of product parts are in this category and thus it is the initial group in which to implement improvement. The score is calculated by using an equation with general application, such as Microsoft Office Excel. The supplier who gets the highest score for total performance will be selected as a key supplier for improvement in supplier performance and development in the supplier relationship program.

Keywords – Supplier Evaluation, Supplier Selection, Supply Chain Management, Supply Base Management, Garment Industry.

Paper type – Case Study (Graduate project)



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CHAPTER I

INTRODUCTION AND RATIONALE OF THE STUDY

Background of the study

Suppliers are an integral part of the supply chain of an organization, and management of suppliers requires specialized negotiating skills, as they are not a part of the organization. Suppliers have to be selected carefully, as they can have a very positive or a very adverse impact on the overall performance of the organization (Ramakrishnan, 2007). For instance, it has been reported that a majority of quality problems of an organization are due to defective material (Heizer and Render, 2006) and carefully selected, competitive suppliers can go a long way in minimizing adverse impacts and in fact in enhancing positive impacts on the quality of output of an organization.

Thus, supplier selection is a crucial part of the functioning of an organization. There is a wealth of literature available that describes best practice and models for evaluating and measuring supplier performance (Tan et al., 1999; Neely, 1999; Anderson and Lee, 1999; Tracey and Tan, 2001; Çebi and Bayaktar, 2003; Gunasekaran et al., 2004). High performing organisations tend to place less importance on unit price as a selection and evaluation criterion; they select and evaluate suppliers on the basis of good quality, delivery reliability and product performance (Gunasekaran et al, 2004). They also involve their key suppliers in the decision-making process and successfully involve them in continuous improvement programs (Tracey and Tan, 2001). Supplier selection is increasingly recognized as a critical decision in supply chain management in manufacturing industries (Choi and Hartley, 1996; Dahel, 2003). In such industries, raw materials and outsourced components are usually the largest costs, and the procurement department often plays an important role in reducing purchasing cost and selecting appropriate supplier (Ching and Bai, 2006).

1.2 The Garment Industry Situation

1.2.1 Global Garment Industry ([HTTP://WWW.THAIGARMENT.ORG](http://www.thaigarment.org))

The global textile and garment situation:

The current trend shows Southern Asia countries and South East Asian countries have emerged as important sources for United States and European Union (EU) clients since they are biggest textile and garment markets in the world.

The world's textile and garment market situation in 2006 and the beginning months of 2007 were rather stable, without any great change. Chinese textile and garment exports are not greatly influenced from the quota imposition by the U.S. and EU, whereas some of developing countries in Asia, such as Bangladesh, Cambodia and Vietnam continue to increase their high export rate. The percentage of textile and garment goods produced by the U.S. and EU manufacturers reduces.

Chinese textile and garment exports to the world in 2006 still rose by 25% in value, and by 21% in volume, compared to 2005. In this growth, there is a great contribution from other markets besides the United States and EU. Textile and garment imports by both the United States and EU from Asian low cost manufacturing countries have rather sharply risen. Concretely, Bangladesh's textile and garment exports to United States rose by 22%, and to EU rose by 34%. EU's textile and garment imports from Vietnam have even risen by 51% on value. Cambodia and Indonesia have also seen a sharp increase in textile and garment exports to both the U.S. and EU marketplaces. Asian developing countries continue to derive benefits from their low cost export textile and garment products. Bangladesh, Cambodia and Vietnam are those victorious countries in the post-quota period of the world's textile and garment trade, along with China.

1.2.2 Thailand Garment Industry ([HTTP://WWW.THAITEXTILE.ORG](http://www.thaitextile.org))

Thailand's textile and garment situation

Considering Table 1.1, in 2007, the revenue from the garment category is USD 2,498 million with a negative growth rate of 6%. The most revenue comes from textile,

followed by garment, but the growth rate increases a little bit when compared with the growth rate in 2006. On the other hand, the growth rate of garment is much reduced when compared with the growth rate in 2006 and other items.

Table : 1.1
Value of Thailand's Export Textile and Garment

ITEMS	EXPORT REVENUE (MILLION USD)						GROWTH RATE (%)		
	2003	2004	2005	2006	2006	2007	2005	2006	2007
					JAN-OCT	JAN-OCT			JAN-OCT
TEXTILE	5,465	6,400	6,700	6,835	5,660	5,793	4.70	2.10	2.30
GARMENT	2,760	3,093	3,151	3,199	2,638	2,498	1.90	1.70	-6.00
WOVEN & NONWOVEN	875	1,035	1,083	1,104	903	965	4.60	1.90	6.70
COTTON & SYNTHETIC	540	680	756	718	595	700	11.30	-5.00	17.50
OTHERS	1,290	1,592	1,710	1,816	1,504	1,631	7.40	6.20	8.40

Sources : Thai Textile Institute (2007)

Considering Table 1.2, the main export market of the Thai textile and apparel industry is USA with export revenue of USD 1,654 million, followed by EU. The growth rate of expansion to USA decreased in 2007 with negative 5.13% when compared with the growth rate in 2006. On the other hand the growth rate of expansion to the EU market also decreased with a growth rate of 0.54%. However, the total of growth rate in 2007 increased by 2.35% when compared with the growth rate in 2006.

Table : 1.2
Export Market for Thailand's Textile and Garment in Jan – Oct, 2007

MARKET	EXPORT VALUE (MILLION USD)					GROWTH RATE (%)		
	2004	2005	2006	2006	2007	2005	2006	2007
				JAN-OCT	JAN-OCT			JAN-OCT
USA	2,083	2,111	2,084	1,743	1,654	1.34	-1.31	-5.13
EU	1,195	1,211	1,317	1,082	1,087	1.31	8.78	0.54
ASEAN	657	776	803	657	762	18.07	3.55	15.93
JAPAN	430	413	395	338	309	-4.00	-4.15	-8.64
CHINA	266	283	250	205	219	6.16	-11.61	7.12
OTHERS	1,769	1,907	1,986	1,653	1,762	7.82	4.13	7.73
TOTAL GLOBAL	6,400	6,700	6,835	5,660	5,794	4.68	2.02	2.35

Sources : Thai Textile Institute (2007)

Considering Table 1.3, China is the world leader in exporting apparel, with 32.87% of market share. Thailand is 17th in order in the export of apparel to the world market with 1.29%. Thailand lost market share to the competitors in 2004 to 2006, as Table 1.3. shows.

Table : 1.3
Market Share Figure in Global Garment Industry in 2006

Market Share Figure in Global Garment Industry

25 Countries of Exporting Garment in Global Market

Rank	Country	Market Share%			Rank	Country	Market Share%		
		2004	2005	2006			2004	2005	2006
1	China	26.03	31.15	32.87	14	Netherlands	1.64	1.62	1.61
2	Italy	5.55	5.29	4.90	15	Spain	1.27	1.29	1.33
3	Turkey	4.68	4.55	4.28	16	U.K.	1.44	1.34	1.30
4	Germany	4.14	4.13	4.00	17	Thailand	1.45	1.32	1.29
5	Hong Kong	4.32	3.77	3.57	18	Portugal	1.34	1.17	1.22
6	Bangladesh	2.94	2.84	3.40	19	Tunisia	1.38	1.25	1.17
7	India	2.56	3.15	3.30	20	Morocco	1.32	1.16	1.16
8	France	2.36	2.32	2.33	21	Cambodia	0.93	0.97	1.10
9	Indonesia	1.95	1.97	2.29	22	Sri Lanka	1.12	1.08	1.10
10	Mexico	2.97	2.56	2.11	23	Pakistan	0.99	0.92	0.98
11	Belgium	2.05	2.14	2.06	24	Honduras	1.18	1.09	0.97
12	Vietnam	1.72	1.74	2.01	25	Philippines	1.02	0.91	0.91
13	Romania	2.08	1.87	1.72		Sub Total	78.43	81.60	83.00

Sources : Global Trade Atlas and Thailand Textile Industry ,
[HTTP://WWW.THAITEXTILE.ORG](http://www.thaitextile.org)

According to the textile statistics, the situation in apparels is that there is very high competition in the world market. China is the first in order in the textile and apparel world market and has a high market share because of its low cost of production and high production efficiency.

The safeguard measure for limits on importing textile and apparel from China in EU will be eliminated on January 1, 2551. The safeguard measure in USA will also be eliminated in 2552. Thailand will see the impact of the safeguard measure elimination. Thailand competitive advantage in term of cost is very difficult since the cost of production China and Vietnam is lower than Thailand. Therefore Thailand's textile and garment exporters have to adjust and find ways to maintain their market share in the world market.

The information from Thai Textile Institution shows the problems in export textile and apparel industry as the following:-

- ❖ Lack of product distinctiveness and variety due to lack of product research and development (R&D) with also lack of innovation technology

- ❖ Lack of serious cooperation and integration between the clothing industry and textile industry (supply chain), and thus efficiency through quick response to the market is less. Moreover, it leads to high cost of products.
- ❖ Less efficiency and skill of labour and human resource.
- ❖ The competitors are more efficient.

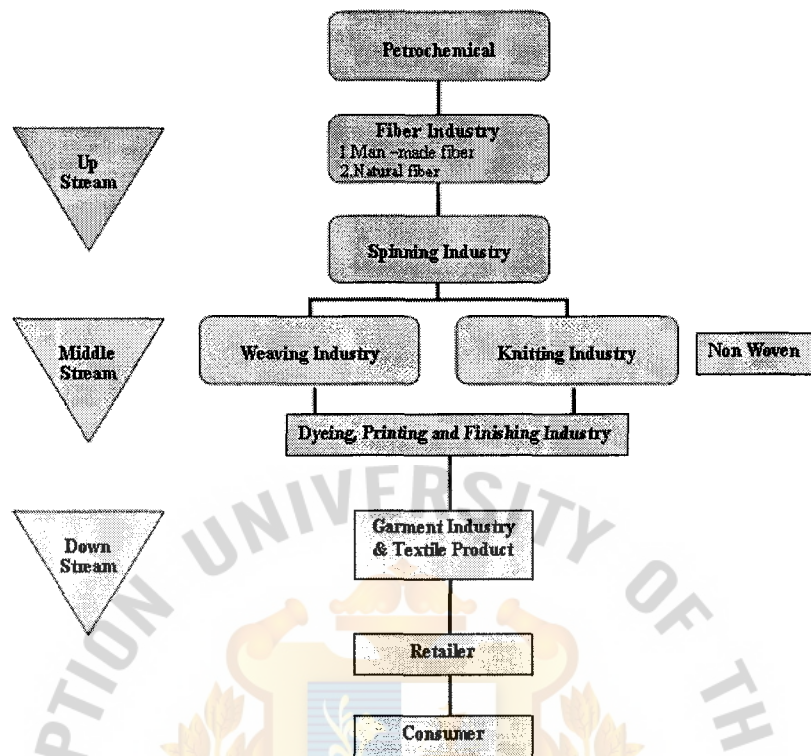
The main problems in the above, is that the USD currency is losing its value effect on the export industry. However the currency problem is not the only factor that causes Thailand to lose market share. Since there is high competition in the market, the participants in the chain have to pay more attention and make adjustments to maintaining the market share in the current situation.

The main competitors in Asian that compete with Thailand are Bangladesh, Vietnam, Indonesia, China and India. Thai textile and garment exporters have to find a strategic way to create their competitive advantage and increase their competency for competing with the competitors in the world market.

1.3 Supply chain in the garment industry

A supply chain is “an integrated process wherein a number of various business entities (i.e., suppliers, manufacturers, distributors, and retailers) work together in an effort to: (1) acquire raw material/components, (2) convert these raw material/components into specified final products, and (3) deliver these final products to retailers” (Beamon, 1998, pp. 281-294). Supply chain management in the textile and garment industry can be very complex as the supply chain is very long, as shown in Figure 1.1.

Figure 1.1
Business Chain in Textile industry



Source: Thai Textile Institution,
[HTTP://WWW.THAITEXTILE.ORG/DATAARTICLE PROCESS.HTM](http://www.thaitextile.org/dataarticle/PROCESS.HTM)

The above Figure 1.1 overviews the relatively long chain, involving a number of parties, and consisting of many small extremely fragmented chain members from upstream to downstream. In other words, the participants are suppliers, manufacturers and customers (import buyers or garment traders). Each stage in the chain consumes the time needed to deal with the suppliers during development and production for launching the finished goods to the global market. The garment process starts from raw material (fibre) that will be transformed into raw fabric. The raw fabric will go to dyeing or printing in colour, and fabric finishing. The ready fabric will be converted in the work process to be garments or finished goods, and ready for delivery to the customers. Moreover, the fabric suppliers are not the only parties whom the garment producers deal with, as they also deal with the accessories suppliers since they also provide an element in the product.

1.4 ABC (Thailand) overview

1.4.1 ABC Group

The ABC Group is constantly expanding in the international market and targets the global market especially in the European Zone. This company is sourcing and manufacturing for export garment companies which mainly specialize in boutique fashion children's wear. The main markets are France, Spain and Italy.

ABC Group's Products

Designing, developing, manufacturing and sourcing children's wear from newborn babies to 14 year-olds has always been the core of the Company's specialization. Moreover in the children product line, the company also sources a variety of products at the customer's request. Flexibility and adaptability are the keys to the successful development of children's wear. Multi-colored embroidery, all-over prints, and washing effects on multiple fabric types are common features of the company's developments. The production capability is limited only by the imaginations of the customers. The company works with both knitted and woven fabrics and can accommodate a wide range of requests for embroidery, printing techniques, and washing effects.

1.4.2 ABC (Thailand)

ABC (Thailand) has opened in 2004. The company is a garment agency for exports to the European market. The direction of ABC (Thailand) is the same as that of the ABC Group.

Mission

Global Apparel Solutions Company, ABC Group Ltd, aims to provide design, sourcing and production solutions and build crucial business networks based on values, information, flexibility and capabilities.

Vision

ABC Group Ltd strives for world-class garment solutions through aggressive growth in the company's core areas of expertise, and has long-term commitments towards its staffs, customers and industrial partners.

Philosophy

Providing **Quality Products and Services** represents the cornerstone of the ABC

company philosophy. ABC endeavors to not only meet, but consistently exceed customer requirements to its fullest capacity.

Perspective

ABC Group strives for continuous improvement and unrelenting attention-to-detail in all developments, cementing its long-term commitment to customers. The company endeavors to extend its activities beyond the basics and position itself as market leader.

1.4.3 ABC Expertise

Product Development Model

The service commitment starts at the design level and ends at the retail level. All European and Thai offices are staffed with highly experienced designers who work alongside customers to render their concepts into a real design series ready for sampling or production. Designers work with their own paper pattern studio equipped with the latest Lectra software© solution to assist customers during the development process. Realising that each product range the company offer differs enormously during pattern development, the company dedicates each studio to a maximum of two product ranges to ensure the highest quality pattern making solutions for our customers and their development teams. The company believes that its Product Development Model shortens the time from concept to approved technical files, ready for sampling and production. The Asian offices provide design and pattern teams with a vast fabric and accessory library, printing and washing techniques and a unique boutique sampling room located in downtown Bangkok, Thailand (ABC Thailand). Dedicated to serving the needs of its design and pattern teams in Europe, the company transforms customers' ideas into real apparel pieces for either prototype or sample development.

Material Sourcing Management

Material Sourcing Management is the core of the business, representing over 50 per cent of the development process. All the Asian offices are organised to manage their own material sourcing from a list of preferred partners, particularly fabric suppliers. The company commitment of service ensures that its customers receive the best available sourcing to achieve their design, development, budget objectives, and ensures that quality standards and delivery schedules are respected and continually improved. Efficiency in material procurement keeps the company ahead of the

company's competitors and increases the effectiveness of the company Product Development Model.

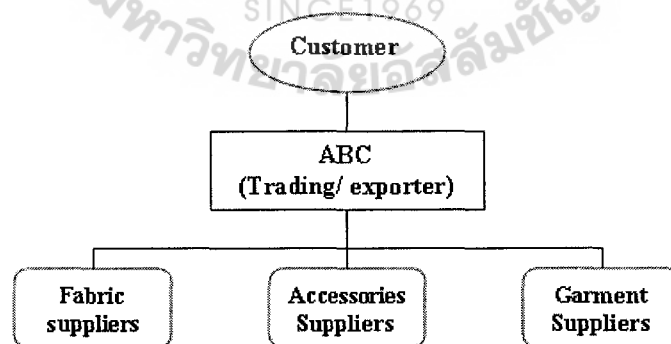
Production

At the core of the company service commitment lies its production department which is equipped to cater to the needs of customers and markets. Currently, the products produced in China, Thailand, and Vietnam differentiate production locations based on quality/price ratios developed after years of experience. The production team in Hong Kong liaises with respective teams in Thailand and China to decide the correct production location which will translate into apparel that exceeds the customer expectation.

1.4.4 ABC (Thailand) and Supply Chain

According to the supply chain definition in various items of literature, the supply chain is the integrated and linked set of processes from upstream to downstream. Supply chain management “is the integration of key business processes from end user through original suppliers that provide products, services, and information that add value for customers and other stakeholders” (Chan and Qi, 2003, pp. 209-23). The ABC (Thailand) company is one of the players in the chain and works as the personal link between customers and suppliers, as shown in Figure 1.2

Figure: 1.2
ABC Supply Chain.



According to the overview of the ABC Group, this project will focus on ABC in Thailand, that is trading garment agency and global apparel solutions company which provides **goods and service** of high quality to the customers. The material sourcing management is the core of business and also the beginning source of quality of

products to the customers. The production part is the core of service as the company provides value exceeding the customer's expectation, and translates it into the apparel. The company realizes the importance of suppliers since the suppliers are at the beginning of producing positive or negative quality of product and service.

Information from the Thai Textile Institution shows the problems of Thailand's situation: lack of product distinctiveness/variety, and lack of a serious cooperation between the clothing and textile industries. This implies that it is important to realize the importance of cooperation and relationship between supplier and buyer in the chain. Moreover, the competitiveness in the market is higher than before. Most firms try to find a way to keep improving their quality and delivery and to reduce cost. The improving factors also depend on the supplier performance. Therefore they need to manage their base suppliers. Some companies reduce and streamline the supplier base, and/or develop a closer relationship with suppliers (Scannell et al., 2000). ABC (Thailand) also tries to find the way to adapt to the current situation in the market. Most of ABC (Thailand)'s activities also depend on the suppliers, so the suppliers are very important players for the company which needs to manage the supplier base. By the way, the ABC Company is facing various problems incurred from the suppliers. To integrate, to create relationship and collaboration with the suppliers, needs more realisation. Maintaining good buyer-supplier relationships has been seen as a powerful tactic to strengthen sourcing activities (Monczka et al., 2002). Dilek et al. (2005) say that the benefits of collaboration identified by the members of Textile Dyeing Technologies may be categorized as customer related benefits, productivity related benefits, and innovation related benefits.

- ❖ **Customer oriented benefits:** include lead time reduction, market share increase, and responsiveness to customer needs, on-time product delivery, enhanced customer satisfaction, and improved product quality.
- ❖ **Productivity benefits:** productivity increases, energy, labour, and material cost reductions.
- ❖ **Innovation benefits:** ability to implement new processes and improvement in product/process development cost and time are highlighted as innovation benefits.

To collaborate with the supplier can lead to benefit for the company. But the company cannot provide the same level of relationship for all suppliers. The company has to select the suppliers who best qualify for dealing at more than a transactional level. To access the development of a close relationships level with the supplier, monitoring and evaluating suppliers have to be developed for selecting the supplier with the best qualification. Supplier evaluation method is the way to assess supplier performance, on a set of selected criteria over a period of time. Furthermore, much attention has been paid to the development of effective supplier selection models, trying to deal with structured/unstructured relevant information and qualitative/ quantitative criteria. As discussed in Shin and Danny (2008) and De Boer et al., (2001), a typical supplier selection problem consists of four phases:

1. Problem definition;
2. Formulation of criteria;
3. Pre-qualification of suitable suppliers; and
4. Final selection of the ultimate suppliers.

Therefore the information in the next section will be investigated step by step according to the ideas of Shin and Danny (2008) and De Boer et al. (2001), and apply with suitable methodology to this case study.

1.5 Statement of Problem

Many buyers just rely on their judgment and attitude to evaluate suppliers, and ABC's purchasing department also does the same. The company makes decision without any tools to generate the statistics necessary for supporting the decision making. Although this old way makes evaluation easy, it does not create economic value for the company – and that can lead to a slow and undetected drain on profits. To select the supplier by experience judgment means not to select key suppliers, and thus there is not a good relationship. In some cases the expected supplier's performance does not achieve the company's expectations such as quality, cost, delivery and flexibility of performance. Choy et al., (2002) state that selecting suppliers only on the basis of the evaluators' personal experiences is neither effective nor scientific – due to the inherent risks of subjective judgment and a lack of systematic analysis. ABC Company is facing many problems concerned directly with the supplier, such as quality problem, lead time of development, cost and unwillingness to share information or solve the

problem, etc.. Currently, the company wants to improve the supplier performance especially quality of materials, components and finish goods. In some cases, the suppliers do not want to clarify the problem and do not take the responsibility for their problem due to lack of a special or close relationship with the existing suppliers. The procurement manager assumes that it may come from the relationship between the company and suppliers and supplier's performance. Selecting the best suppliers significantly reduces the purchasing cost and improves corporate competitiveness (Choy et al., 2002). ABC realizes that to collaborate or work closely with suppliers and have systematic supplier selection is very important. Hence this study is designed to address to research question: **“Who are the right suppliers that the company should build the relationship with at a strategic level rather than just a transactional relationship?”**

1.6 Research objective

This research attempts to achieve the following objective:

To apply a supplier evaluation and selection method to determine the capability of the existing suppliers' performance so as to turn them into key suppliers for improvement in supplier performance.

1.7 Scope of the study

The scope of this project is to apply a supplier evaluation and selection method in the purchasing department of ABC (Thailand) Co.Ltd..

1.8 Significance of the study

Applying a method of evaluation and selection to suppliers will be useful for the ABC (Thailand) Company.

1. An evaluation and selection method is the one tool that will help and support the purchasing manager's decision-making to select the right suppliers and fit with the company's objective. The key suppliers will be selected for implementation into the next step of developing supplier relationships.
2. This study provides some kind of confirmation for the applicability of the approach of Teng & Jaramillo (2005) to supplier evaluation.

3. To select the right supplier will produce benefits to the company in terms of quality, price and delivery, etc., as various studied.

1.9 Definition of Key Terms

Supplier Evaluation – is the process of reducing a long list of potential suppliers to a short list and finally to one or more suppliers (Hedderich et al., 2006).

Supplier Selection – The objective of supplier selection is to identify suppliers with the highest potential for meeting a firm's needs consistently and at an acceptable cost. Selection is a broad comparison of suppliers using a common set of criteria and measures (Kahraman, et al., 2003).

Supply Chain Management - The “Supply chain management” term has been used for almost 20 years and is defined as the integration of activities to procure materials, transform them into intermediate goods and final products, and delivers to customers (Heizer and Render, 2001)

Supply Base Management –Van Weele (2000, p.144) defines supply base management as “how many suppliers will be dealt with”

Garment - A garment is an article of clothing. The garment can be made by yarn from synthetic material, animals and vegetables. This raw material will be transformed into the raw fabric pieces and promptly dyed or printed, to reach the finishing stage. The finished fabric is ready to send to a garment manufacturer to cut and stitch each component together according to the customer’s design.

CHAPTER II

LITERATURE REVIEW

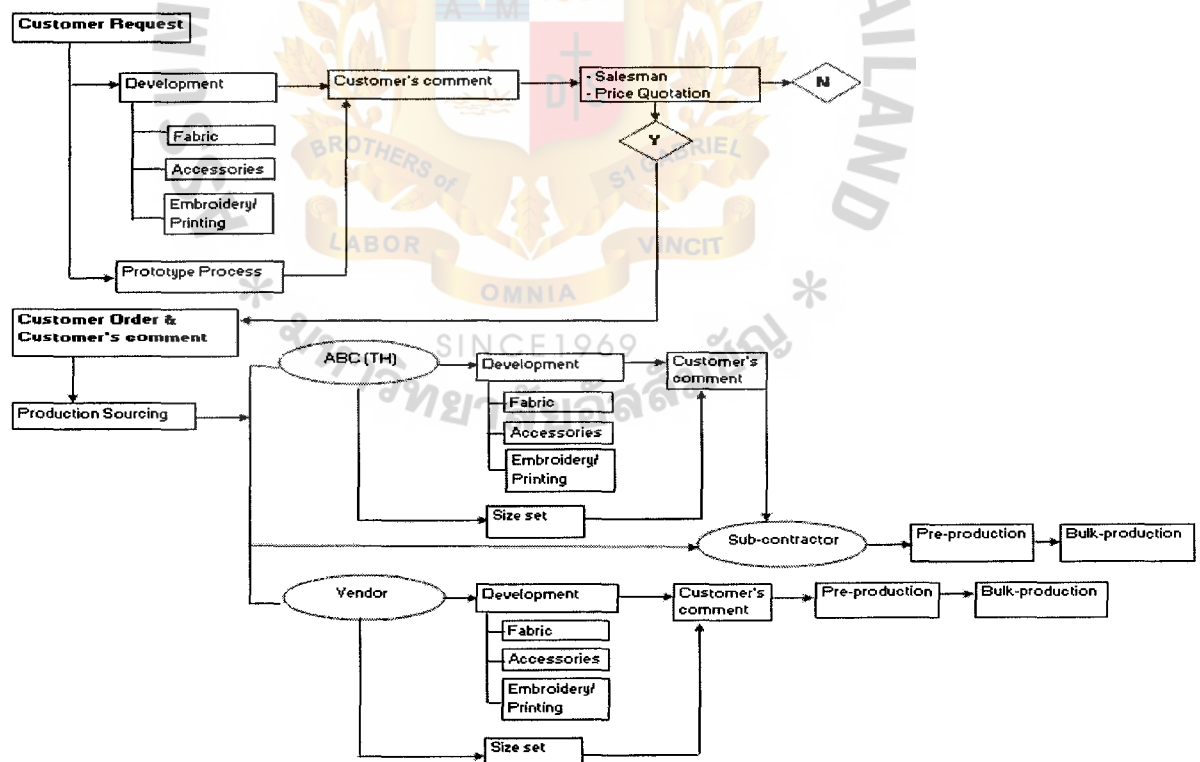
This chapter will present various concepts from the literature, to investigate the theory and previous studies that link with the buyers’ need, company background, supply base management and supplier evaluation and selection.

2.1 Overview of ABC Purchasing and Sourcing function

This section will show the mapping process for investigating and defining the number of suppliers with which the ABC Company makes transaction.

Rajkumar and Pradip (2004) state that in order to ensure the uninterrupted supply of items in a supply chain, more than one supplier or vendor should be available for each item. This company is a trading agent company using multiple sourcing strategies, therefore most of its activities are concerned with purchasing and sourcing for components of goods and finished goods from several suppliers. The cornerstones of the ABC Company are quality of products and giving service to the customer, thus the quality of raw materials, component parts and finished goods have to be the initial success factor. However, price is the factor that is still importance in the competitive market. To transform the quality of goods, service and price for the customers is essential, so the most important part in the chain also depends on the suppliers. Before going to the next section, we have to understand the ABC Company's business flow to investigate the number of suppliers and type of suppliers. The beginning of business is started by the customer issuing the information and sample as the customer's request to the company, as shown in Figure 2.1.

Figure 2.1: Business flow chart



However inside the business flow, the working process is divided into 3 levels.

1. **High level involvement:** - ABC takes the responsibility in buying raw materials for customer's pre-marketing or pilot launching, bulk production until the goods are shipped out to the customers. Since the order placement is low to medium size, with a short lead time for development, and complexity of products, ABC will place the order to a subcontractor.
2. **Medium level involvement:-** ABC takes the responsibility in buying raw materials for customer's pre-marketing or pilot launching. Materials of bulk production will be handled by vendors.
3. **Low level involvement:** - The vendors take the responsibility for all steps in buying raw materials for producing the finished goods and shipping out the goods to the customers.

The level of business depends on the type of product, procedure, and order size.

1. High level involvement :

- The product, procedure and order size are complexities in developing the process and difficult to manage.
- The customers have to pre-launch or pre-sale in order to collect the order from their retailers or customers before bulk production.
- The ordering for bulk production will be produced by subcontractors.

2. Medium level involvement :

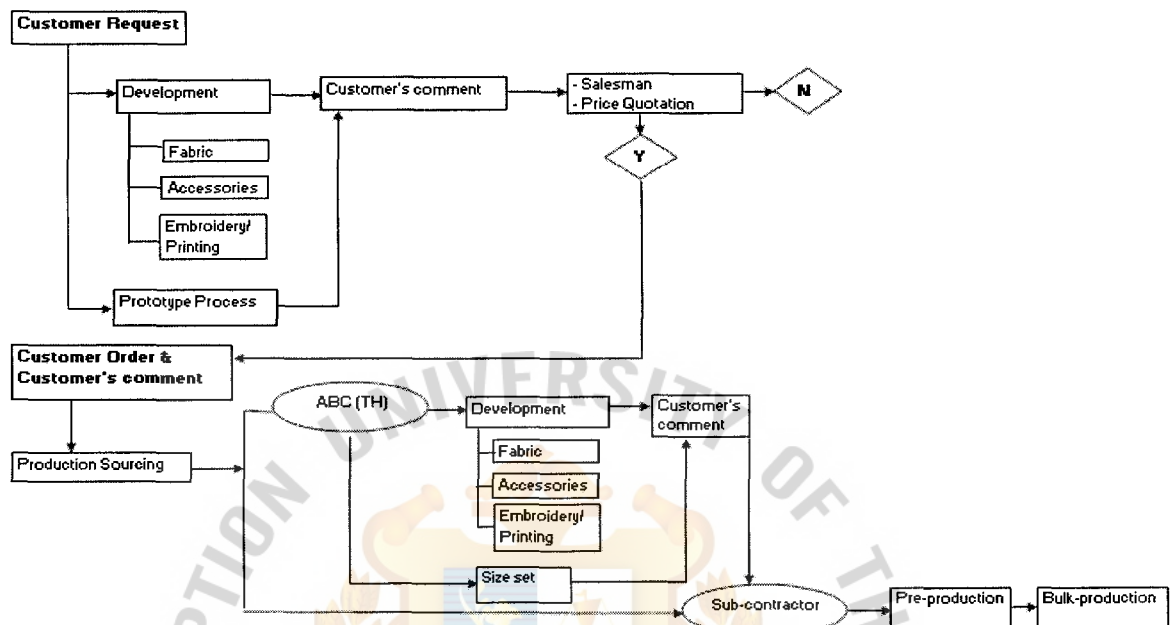
- The product is less complex in the developing process. The order size is medium/high. However the procedure is still a long process.
- The customers have to pre-launch or pre-sales (as in high level involvement).

3. Low level involvement :

- The product is the easiest in the developing process. The order size is high volume.
- The customers give the order placement for bulk production.

Figure 2.2 below shows the working level in “High Level involvement” There are two cases, A and B.

Figure: 2.2: The working level in “High Level Involvement in Case A”



High Level Involvement: Case “A”

The first section; the company will develop the fabric, accessories and decoration part during the making of the prototype according to a customer’s request. The purchasing & sourcing department and merchandiser will deal with the suppliers to develop the components specification as in the customer’s given information. The prototype is also developed in house and submitted to the customer at the same time as materials development and decoration development (embroidery and printing) so as to reduce the time consumption. The customer will see the shape, styling and workmanship in the rough. Coordination with the suppliers is very important because they can help to transform the styling and specification as a drawing or picture become visible and come very close to the customer’s imagination. The speed of development, quality of workmanship, and price and quality of raw materials must be determined.

The second section: After that, the customer will comment on the prototype and material sample or purpose, and will then place an order for a salesman sample.

Sometimes the customers prefer to re-make the second prototype and therefore the company has to re-submit urgently to catch the delivery date for salesman samples. For the materials and decoration development, it may be required to re-submit more than once since the customer's specification is not satisfied, such as the fabric or material color is not the shade identified, size of materials, styling of materials and quality etc. The company has to get approval for prototypes, materials and decoration development before proceeding to the salesman sample. A price will be submitted with the salesman sample. The customer will negotiate the price in this section.

The third section: The customer's negotiation for price of product can be done during the customer's sales period. Some styles will get an order and some styles will not get the order. Sometimes all styles will not have an order. It depends on many factors. Sometimes, all styles will be cancelled because:-

- A) It is too late to launch the sample, because of the time consumed during the development and sample process.
- B) The price.
- C) The demand in the market.
- D) The quality of the product.

The fourth section: After the customer places an order to the company, the production department will be source the subcontractors to produce the bulk production. All details will be passed to the production staffs. The production staffs will cooperate with the subcontractors in terms of price and ask them to make the samples in one set by copy the salesman sample, checking the quality of workmanship and selecting the subcontractors to handle the order.

On the other hand, the customers will comment on the product in terms of material, decoration and workmanship (sewing method and quality of product) or the after pre-sale process. Cooperation with the material and decoration suppliers is still handled by ABC. After correcting the materials according to the customer's comment on the salesman sample, all materials will be purchased by ABC.

All the sizes in each style will be made by the internal sample room of ABC during correction of the materials according to the customer's comment on the salesman

sample. Size set samples will be submitted to the customer. The customer will check the size specification and workmanship of the sample, and after that the customer will send comments for improvements in the bulk production.

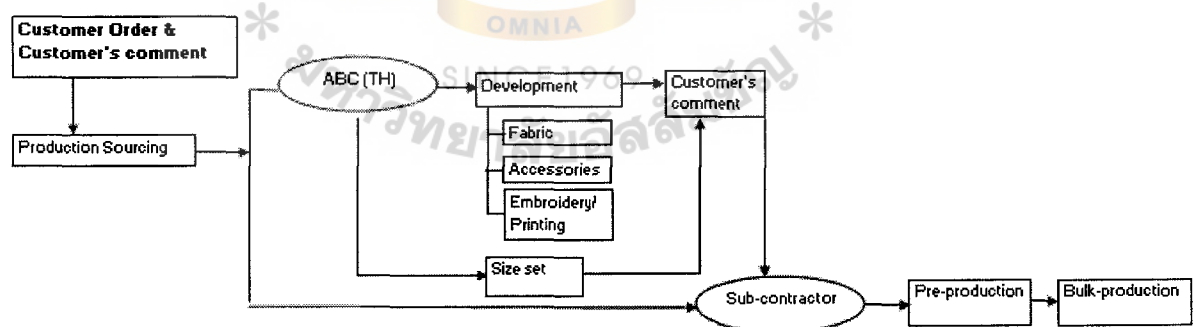
The reasons that the size set will be done by ABC are below:

- To control the quality of workmanship.
- It is easy to copy since the size set will be done and modified according to the customers' comment.
- Short-cut the time. Most subcontractors do not have a pattern department and some subcontractors are less skilled. That will consume a lot of handling time.

The fifth section: Some customers may require another set of pre-production (samples will be made in the real material as in bulk production) before a go-ahead to for bulk production. This section can be skipped because it depends on the customer's requirement. Besides that, the size set with comment will be sent to the subcontractors for producing the pre-production or bulk production.

For Case "B" as another case in High Level Involvement, Figure 2.3 below shows the working process in case "B"

Figure: 2.3: The working level in "High Level Involvement in Case B"



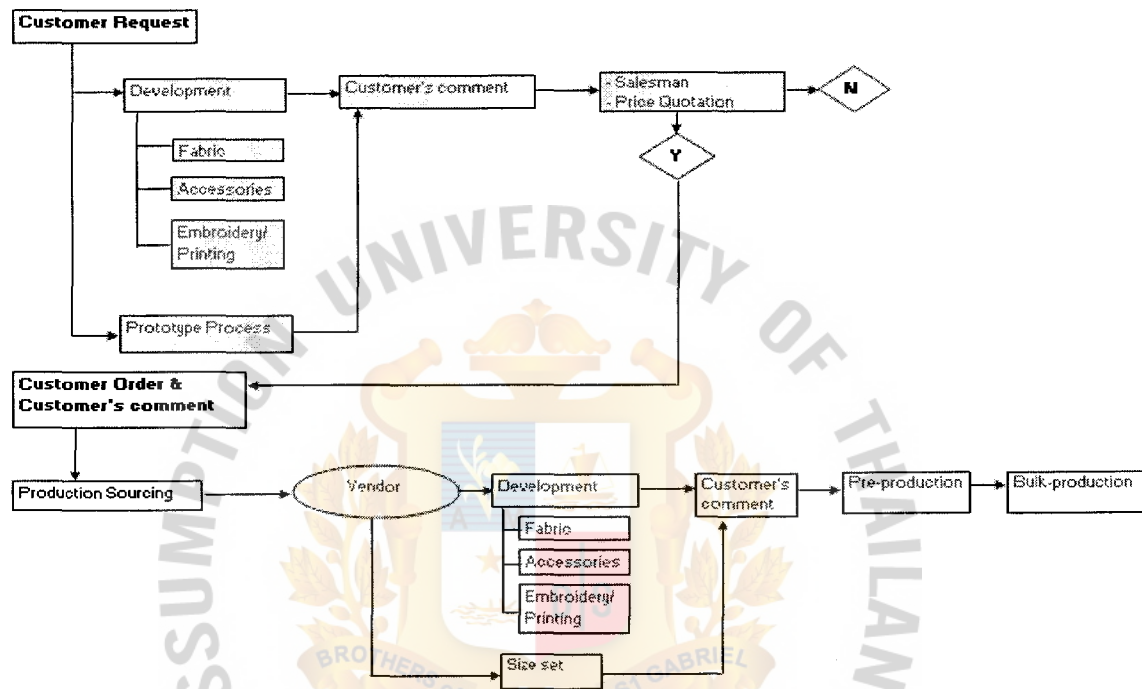
High Level Involvement: Case "B"

For this case, the salesman sample/pre-sales is skipped. The customer will place an order for bulk production. The customer will send the garment sample with some comments on the garment sample and details of products in order for corrections to be made in the bulk production. The price will be quoted by ABC.

The development process will be done by ABC. All information about products will be passed to the production department and other departments concerned. After this, the process is the same as Case “A” in the fourth and fifth sections.

Figure 2.4 below shows the working level in “Medium Level Involvement”.

Figure: 2.4: The working level in “Medium Level Involvement in Case B”



Medium Level Involvement:

The first to third sections: these sections will be done by ABC, the same as for “high level involvement” in case “A”.

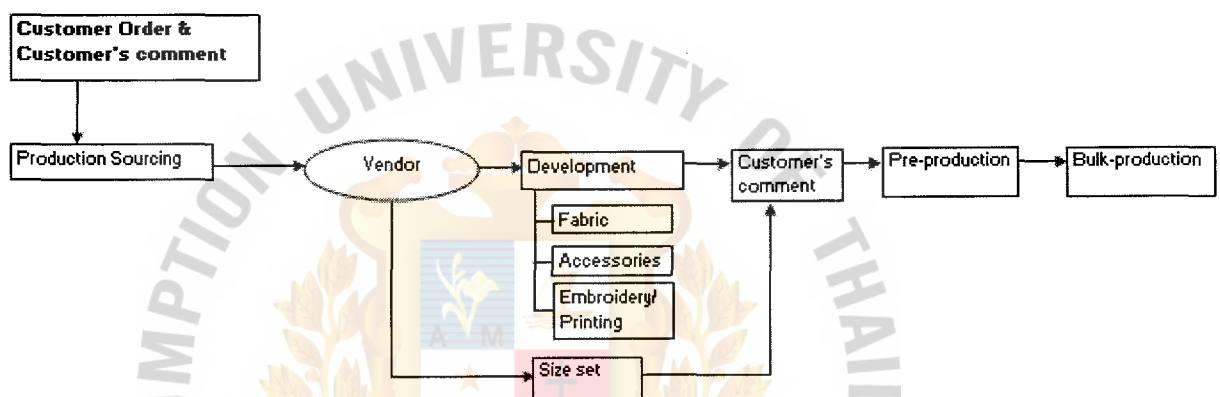
The fourth section: After the customer places an order to ABC, all details will be passed to the production staffs. The production department will source the vendors for producing the bulk production.

- The production staffs will ask the vendors to submit the price first.
- The production staffs will select the vendor base on price. It does not need to submit the sample before making the size set since the vendors submitted their product to show their quality. Moreover the production staff even went to visit the vendor’s factory.

The production staffs will cooperate with the vendors. On the other hand, the customers will give comments about the product in terms of material, decoration and workmanship (sewing method and quality of product) after the pre-sale process. All procedures after getting the order and comments will be passed to, and all processes handled, by vendors. However, ABC also monitors and controls the quality and follow up the delivery status for on-time delivery.

Figure 2.5 below shows the working level in “Low Level Involvement”.

Figure: 2.5: The working level in “Low Level Involvement”



Low Level Involvement:

For this case, the salesman sample/pre-sales is skipped, as in High Level Involvement in Case “B”. The customer will place an order for bulk production, sending the garment sample with some comments and details of products in order to make corrections in the bulk production. The price will be quoted by ABC. The production staff will source the vendor to handle this. Price and quality are the major criteria to determine selection of the vendors. The rest of the process will be handled by the vendor from development to finish of the bulk production under ABC’s control.

The suppliers’ categories:

From the first section till the last section of each level involvement, the suppliers are the important part of the product. There are four groups of suppliers;-

- 1) Fabric group: 19 suppliers of knitted fabric and 33 suppliers of woven fabric. This category includes local and overseas suppliers.

- 2) Accessories suppliers: there are 133 suppliers for both local and overseas suppliers.
- 3) Sub-contractors for embroidery and printing: there are 17 suppliers. All suppliers in this category are local suppliers.
- 4) Finished goods and sub-contractors for producing garment: there are 65 local suppliers.

The total of all suppliers is 267 that ABC deals with. The highest spending cost is the fabric category as it is 50 percent of the product. The cost of finished goods and sub-contractors of finished goods is 32 percent, sub-contractors for embroidery and printing are 10 percent. For the accessories part, the company cost is 8 percent.

Referring to ABC's activities in each level, all of suppliers are an important part of the business chain. Most customers will consider the quality and price of products as the major points. The quality and price deals with all processes from downstream to upstream in the chain. In other words, the quality and price are accumulated from raw materials. The suppliers are also an important part of the business. Moreover, because of the strong competitive pressure in the global market, many organizations provide their products and services to the customer faster, cheaper and better than their competitors. The implementation of SCM practices aims to establish a close buyer-supplier relationship as a true partnership among companies in the supply chain, beyond just price negotiations (Sarkis and Srinivas, 2002). By the way, ABC also adds its service in serving the customer as a competitive advantage point.

ABC (Thailand) branch was created in 2004. The company is continuing to grow and improve. Moreover, the company hopes to decrease the problems and improve the supplier performance that relate to the supplier by building relationship with the suppliers. To identify an evaluation and selection supplier system, the company does not have any system to evaluate or select the supplier since the company is newly established. However, the branch manager, sourcing and purchasing staffs realize that to have an evaluation and selection system is useful, and can be used to support the decision making to select the right supplier to start building the supplier relationship. To work closely with all suppliers is difficult, therefore they have to select the right suppliers to deal with.

2.2 ABC Company's "Supplier Selection Process"

The various types of suppliers have already investigated under the topic of supplier categories. There are four types of suppliers that ABC Company contracts with (fabric suppliers, accessories suppliers, sub-contractors for embroidery/printing and finished goods/sub-contractors). This section will describe each supplier in detail and the current process of supplier selection in ABC Company.

Fabric Supplier: The fabric suppliers include both knitted and woven fabric. Fabric is the main material for producing garments, and some packaging is made from fabric.

Accessories Supplier: The accessories are also importance parts of garments for assembling the pieces of fabric, such as cotton thread and polyester thread. The accessories also include button, zip, badge, label and bead, etc.

Embroidery and printing Supplier: This is the decoration part. It includes embroider and print on fabric, or cutting pieces of fabric, depending on the garment style. The picture or motif can make the garment more interesting and attractive.

Finished goods Supplier/ sub-contractor: The finished goods supplier is the manufacturer or producer of the garment or the goods that are ready-to-buy. They will take responsible for buying all materials for producing the goods. In the definition of ABC Company: a sub-contractor is a small size of garment producer and they will handle only a part of work in process. The ABC company has to order and pay for fabric/ accessories/ embroidery or printing and packing.

The next part of this section will explain the current process of supplier selection.

The current process of supplier selection is that the ABC Company selects the suppliers by judgement based on experience. The process of selecting suppliers starts from the customer enquiry. When the customers or branch offices send the enquiry to ABC Company, the order will be allocated to a merchandiser depending on the manager assigned. After that, the merchandiser will pass the details about the raw material or components to the purchasing department. In the purchasing department, there are two staffs for handling the merchandisers' request. It is divided into fabric and accessories and embroidery/ printing. For finished goods, sub-contractors will be handled by the production sourcing department. Both the purchasing department and the production sourcing department will handle merchandisers' requests. The purchasing staffs and production staffs use their experience to judge and select the

supplier in order to match with the enquiry. After the purchasing staffs and production staffs get the details of an enquiry, they will pass the information to selected suppliers (small number of suppliers) from the list of suppliers on hand and their experience. They will ask each supplier to submit the price and sample, and after that the supplier who can offer the best quality (from the sample or commitment), price and other factors will be selected. Sometimes, more than one supplier will be selected for alternative choice since there is little different offered by each supplier. Sometimes the suppliers cannot offer a sample but insist that they can follow the material specification, and this case can be accepted. After that the purchasing staffs select only the best qualified to pass all samples and details of suppliers to merchandiser to satisfy the customer. However, there are various problems, such as the quality of the product in a real order is not the same as the sample, delivery date delay, and overload capacity, etc.

2.3 Supply base management

This section will refer to the supply base management in the concept of the benefit of relationships. The literature will help to support the company assumption about the benefit of supplier relationship, related to supplier's performance.

Van Weele (2000, p.144) defines supply base management as "how many suppliers will be dealt with" It implies that the number of suppliers in the supply base is the one important issue. Van Weele (2000, p. 144) also claims that "what conditions and qualifications the best-in-class suppliers should meet" is an important question in supply base management, thus highlighting management of supply performance as a key issue. Holmen and Pedersen (2008) state that supply base management is the nature of the relationships between the buyer and the suppliers. Gadde and Hakansson (2001) argue that achieving deeper cooperation with selected individual suppliers is one of the most central issues in managing the supply base. A number of studies have examined the linkages between relationships and performance. These have demonstrated gains to the buyer from successful relationships in terms of financial (Carr and Pearson, 1999; Martin and Grbac, 2003; Johnston et al., 2004), and lead time performance (Larson and Kulchitsky, 2000). In addition, these relationships can result in improved responsiveness and customer loyalty (Martin and

Grbac, 2003), innovation (Corsten and Felde, 2004; Johnston et al., 2004), and quality (Johnston et al., 2004). From a supplier's perspective, they can lead to reductions in inventory cost (Kalwani and Narayandas, 1995) and lead time (Kotabe et al., 2003), as well as improvements in product/process design, quality (Kotabe et al., 2003), financial performance and future relationship prospects (Duffy and Fearn, 2004).

Referring to the benefits of buyer and supplier relationships, Cormican and Cunningham (2007) state that many benefits are lauded to accrue to organisations that develop close relationships with a small number of critical suppliers. For example, rescheduling activities can be simplified, volumes can be consolidated and discounts negotiated, chosen suppliers can dedicate capacity and reduce lead time and the cost of logistics can be minimized.

Referring to the literature review about supply base management and relationships between buyers and suppliers, ABC Company realises selection of the right supplier, and the relationship between buyer and supplier, are important. For suppliers, the ABC Company uses multiple sources for each material and product. Therefore the number of suppliers is various, to reduce the risk, to select good product quality and to lower cost. But who are the right suppliers with the best qualifications to deal with, so the number of suppliers have to be screened to find the right supplier. The company has to conduct evaluation of supplier's performance and selection as a key issue as Weele (2000) implied.

2.4 Overview of Supplier Evaluation and Selection

Yin and Pei (2007) state one consequence of market globalization; it has been a growing incidence of collaborative ventures among companies from different countries. Small and large, experienced and novice, companies increasingly are choosing partnerships as a way to compete in the global market place. Traditionally, vendors are selected from among many suppliers based on their ability to meet the quantity requirements, delivery schedule, and price limitation. In this approach, suppliers aggressively compete with each other. The relationship between buyer and supplier is usually adversarial. In this global supply chain era, the cooperation between buyer and supplier is the starting point to establish a successful supply chain

management and a necessity. Therefore, supplier evaluation and selection are very important to the success of the supply chain process (Bhutta and Huq, 2002).

Supplier selection and evaluation are directly related to the purchasing function since the purchasing function encompasses determining the need, selecting suppliers, arriving at a proper price, specifying terms and conditions, issuing the contract or order as well as following up to ensure proper delivery. Among the primary purchasing functions, one of the major responsibilities is the evaluation and selection of suppliers. Supplier Evaluation is the method to assess supplier performance on a set of selected criteria over a period of time.

2.5 Traditional supplier selection methods.

There are four traditional common methods used for supplier selection: categorical model, weighted-point model, cost ratio model and dimensional analysis model. (Teng and Jaramillo, 2005; Humphreys et al., 1998; Dobler et al., 1990; Leenders et al., 1989; Timmerman, 1986; Zenz, 1987).

- i) **Categorical model:** The simplest method is the categorical method. With this approach, the customer assigns a preferred, satisfactory, or neutral rating for each of the attributes on which the supplier is being evaluated. The ratings are determined by agreement between the various purchasing representatives in the organization and a total is obtained for each supplier. The supplier with the maximum score is then selected. However, one of the problems with this approach is that the attributes are given equal weighting, which clearly is not the case in practice.
- ii) **Weighted point:** The most frequently used method of evaluation is the weighted point method. With this technique various factors that are important to customers are weighted according to their relative importance. Each weight is then multiplied by the assigned performance score. Finally, these products are totalled to determine a final rating for each supplier. The main disadvantage of this approach is that the performance measures used for the various criteria must apply standardized units.

iii) **The cost ratio approach:** is a more complicated technique for evaluating suppliers. Standard cost analysis is applied and cost ratios for quality, delivery and customer service factors are used to calculate a net adjusted cost for each vendor. The cost ratio provides a measure of the cost of each factor as a percentage of total purchases for each potential supplier. Summing the cost ratios gives an overall total which can then be used to determine the net adjusted cost. The supplier with the lowest net adjusted cost would then be the preferred supplier.

The cost ratio approach is not widely used in industry and is complex, requiring a comprehensive cost-accounting system, which is usually only found in larger companies.

iv) **Dimensional analysis method :** Willis et al.,(1993) have proposed an innovative technique to supplier evaluation which attempts to resolve some of the difficulties highlighted with the other methodologies described, namely, they do not provide a generally applicable methodology from combining multiple criteria or attributes into a single measure of supplier performance.

Andreas et al., (2006) studied the outsourcing decisions and the purchasing process, and in this article has summarized the decision making method for the interest and information of leaders, as in Table 2.1 below.

Table: 2.1
The summarize table of decision making method

Decision method	Main advantages	Main disadvantages	Sources
Analytic hierarchy process (AHP) and Analytic network process (ANP)	Based on decision maker's judgment concerning importance of criteria and extent to which they are met by each alternative	Because of subjective scale; vulnerable to human error. Adding an extra criterion may cause the classification process to change	Nydick and Hill (1992), Barbarosoglu and Yazgac (1997), Masella and Rangone (2001) and Sarkis and Talluri (2000)
Artificial intelligence models (expert systems; neural networks)	Since, designed to resemble human judgement, do not need formalisation in decision-making process, and therefore, can handle high complexity and uncertainty; easy for non-experts because based on computer-aided systems	Require constant maintenance to remain effective Resource- and time-consuming process	Mandal and Deshmukh (1994), Vokurka <i>et al.</i> (1996), Albino and Garavelli (1998) and Khoo <i>et al.</i> (1998)
Data envelopment analysis (DEA)	Classifies supplier as efficient or inefficient, so can be used as tool for negotiating with inefficient suppliers	Suitable for situations in which multiple inputs and outputs make comparisons difficult	Weber and Desai (1996), Weber <i>et al.</i> (1998) and Liu <i>et al.</i> (2000)
Multi-objective programming	More objective than rating models; generally used in JIT scenarios	Often considers only more quantitative criteria; Assumes predefined levels of quality and service; Needs to be combined with other methods	Weber and Ellram (1993), Current and Weber (1994), Ghodsypour and O'Brien (1996), Karpak <i>et al.</i> (1999a, b) and Degraeve and Roodhooft (2000)
Statistical models	Deal with stochastic uncertainty, e.g. order lead time	Deal with uncertainty one criterion at a time	Ronen and Trietsch (1988) and Mummalaneni <i>et al.</i> (1996)
Total cost of ownership (TCO)	Relatively simple to use; can include all quantifiable costs incurred throughout purchased item's life cycle	Only for single-deal cases; difficult to incorporate service and delivery performance criteria	Smytko and Clemens (1993) and Ellram (1995)

Source: Outsourcing decisions and the purchasing process (Andreas et al., 2006)

This table 2.1 summarises the advantage and disadvantage of each decision making method in an overview.

For instance, explaining the method of AHP and ANP, Percin (2006) states that the analytic hierarchy process (AHP), introduced by Saaty (1977), is a theory of measurement that provides the ability to incorporate both qualitative and quantitative factors in the decision making process. It facilitates decision making by organizing perceptions, feelings, judgments and memories into a multi-level hierarchic structure that exhibits the forces that influence a decision (Bayazit, 2005). In the most common case, the forces are factors that are arranged from the more general to the more specific. Showing a hierarchical structure of the AHP provides an examination of the interactions of goals, criteria, sub-criteria and alternatives in the entire system. For this purpose, absolute measurement and relative measurement approaches are used in the application of AHP. Absolute comparisons are generally used when desired to rank independent alternatives according to standards developed by the experience of

experts (Saaty, 1990). However, relative comparisons require priorities to be established with respect to hierarchical goals by making sets of pair wise comparisons in a systematic manner (Gass, 1986).

Bayazit, (2005) states that analytic network process (ANP) can be used as a decision analysis tool to solve multi-criteria supplier selection problems that contain interdependencies. ANP is a complex methodology and requires more comparisons than the traditional AHP and it increases the effort. ANP uses the same fundamental comparison scale (1-9) as the AHP. Both AHP and ANP use pair-wise comparisons method. There many studies in the supplier decision making approach, and some literature studies in the analytic hierarchy approach (AHP). Various literatures studied the analytic hierarchy approach (AHP) and analytic network process (ANP) Some literatures refer to the advantages and disadvantages of the AHP and ANP methods. This project also overviews the advantages and disadvantages of both methods, as shown below:-

The advantages of AHP:

1. The qualitative and quantitative criteria can be measured.
2. To handle complex problems with multiple levels.
3. Robust and simple method contemplates hierarchical relationship among factors.
4. The users can add the relevant factors and sub-factors that fit with their various situations.

The disadvantages of AHP:

1. Weak in determining interrelationships among factors (Sarkis and Srinivas, 2002).
2. Rank reversal will happen. The order of superiority will be changed if new alternative are added to the hierarchy.
3. AHP has been described as irrational because the question how much A is better than B does not describe the point of comparison (Leung and Cao, 2001).

The advantages of ANP: The advantage of ANP are almost the same as the AHP method. However, there are some points added. ANP can overcome a weakness point of AHP; ANP overcomes AHP by including the information of correlations between factors in the decision making process. Moreover, it can help to reduce the significant the gap between model and reality.

The disadvantages of ANP: Although the ANP can overcome the weakness point of AHP, it is more complex and time consuming than AHP since the information of correlations is added.

Some literature integrates data envelopment analysis (DEA) with total cost of ownership (TCO) and (AHP) Ramakrishnan, (2007). Teng and Jaramillo (2005) also studied decision making methods. They studied two mains methods: - AHP and ANP. AHP is a robust and simple method that contemplates hierarchical relationships among factors considered by decision makers but it is weak in determining interrelationships among factors. Their study found that ANP can overcome the AHP weakness in determining interrelationships among factors, but the determining of the correlation factors makes it a more complex and time consuming process. Therefore ANP was not applied in their model. Moreover, the weakness in the point of determining interrelationships in AHP was not necessary, since the correlation between factors would not be considered, as they wanted their model to be easier to use. They also gave the reason for inconsiderable correlation between factors: they found that the buyers and the cross functional teams in the downstream companies often use some subjective rating scheme to rate factors, but putting efforts into determining the correlations between factors is often not valuable in practice. On the other hand they found the multiple attribute utility approach of Min (1994) provided the adequacy of critical and possibility factors. Therefore the new model is developed from AHP and the multiple attribute utility theory approach, and has the possibility of being altered for “what-if” scenarios and sensitivity analysis.

Moreover they stated that the variables used in the model represent the most critical issues in the evaluation and selection of textile/apparel suppliers. They develop a new model for providing an easy-to use evaluation matrix for helping US textile/apparel companies in selecting the right supply partners to improve the whole supply chain's performance.

Teng and Jaramillo (2005) show that the advantage of their model are its hierarchical approach that covers the decision structure containing major issues in each cluster, its flexibility in adopting changes in business circumstance and its simplicity with no complex equations in the model.

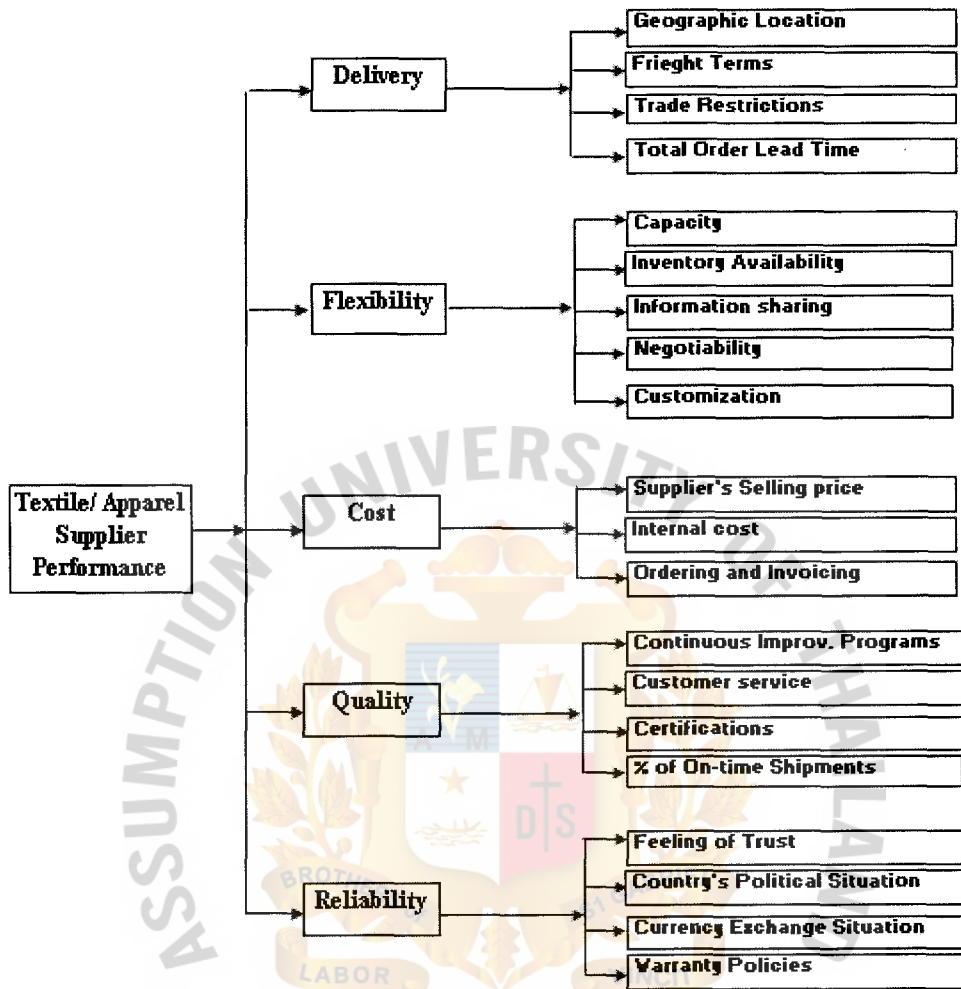
Monczka (2005) stated that “Most purchasing experts will agree that there is no one best way to evaluate and select suppliers; organizations use a variety of different approaches”. Referring to Monczka’s statement, to select a suitable method to apply by determining the nature of the company and product is a better way because there is no one best way. From the various literature, referring to Teng and Jaramillo’s model, their method fits with this case since their research and model were developed specially for a Textile and Apparel Company and is easy to understand.

2.6 The development the criteria factors for supplier evaluation and selection

The factors for supplier evaluation and selection will be identified. Monczka states that the purchasers usually evaluate the potential suppliers across multiple categories using their own selection criteria with assigned weights. A variety of criteria are addressed as they are important in supplier selection. Teng and Jaramillo (2005) identify group the factors by following the recommendation of Saaty (1996); it is called ‘cluster’. His factors are selected based on the most common and significant issues in textile/apparel supply chains. The factors are grouped into five clusters; delivery, flexibility, cost, quality and reliability. Each cluster consists of factors that have an effect on each cluster, as in Figure 2.1. below.

Figure 2.1 : .

Teng and Jaramillo (2005) identify to group the factors for evaluation and selection suppliers in global and textile and apparel supply chains.



The first cluster is delivery: - consists of four factors that include geographic location, freight terms, trade restrictions, and total order cycle time.

The Second cluster is flexibility: - consists of five factors that are capacity, inventory availability, information sharing, negotiability, and product customization.

The Third cluster is cost: - consists of three factors which are supplier's selling price, internal cost and cost for ordering and invoicing.

The fourth cluster is quality: - this cluster consists of continuous improvement, certifications, customer service, and percentage of on-time deliveries.

The fifth cluster is reliability: - The feeling of trust, the country's political situation, the currency exchange situation and warranty are including in this cluster.

CHAPTER III

CONCEPTUAL FRAMEWORK

3.1 Conceptual Framework

This chapter would presents the framework of supplier evaluation and selection in this case study by using Teng and Jaramillo's 2005 methodology and factors criteria to apply in this case study project. Referring to their criteria factors in chapter 2, Figure.2.1, the factors in their research were mostly used. They mentions that the implementation of Supply Chain Management practices aims to establish a close buyer-supplier relationships as a true partnership among companies in a supply chain, beyond just price negotiation since outsourcing is an unavoidable trend in cost-cutting. It is important for textile/ apparel companies to find reliable and trustworthy suppliers. All their criteria factors will be used but each criteria factor will be investigated and screened for matching with this company.

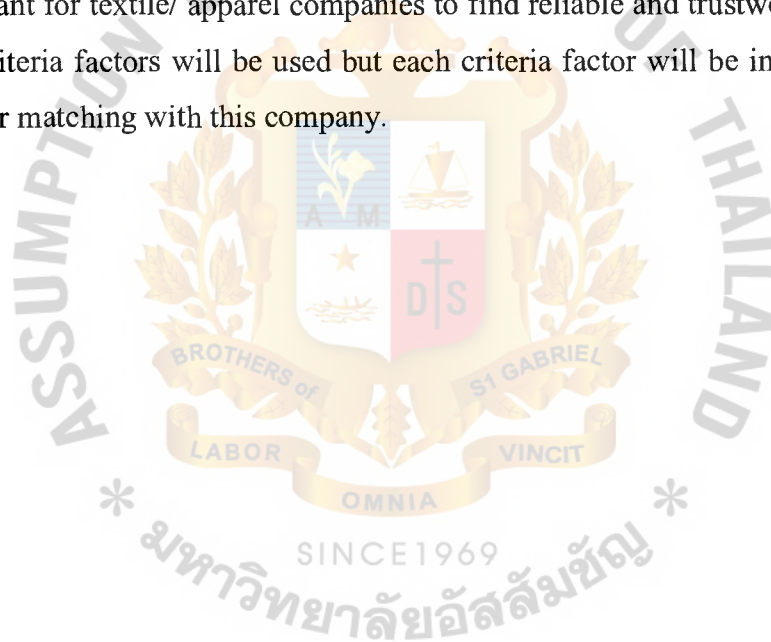
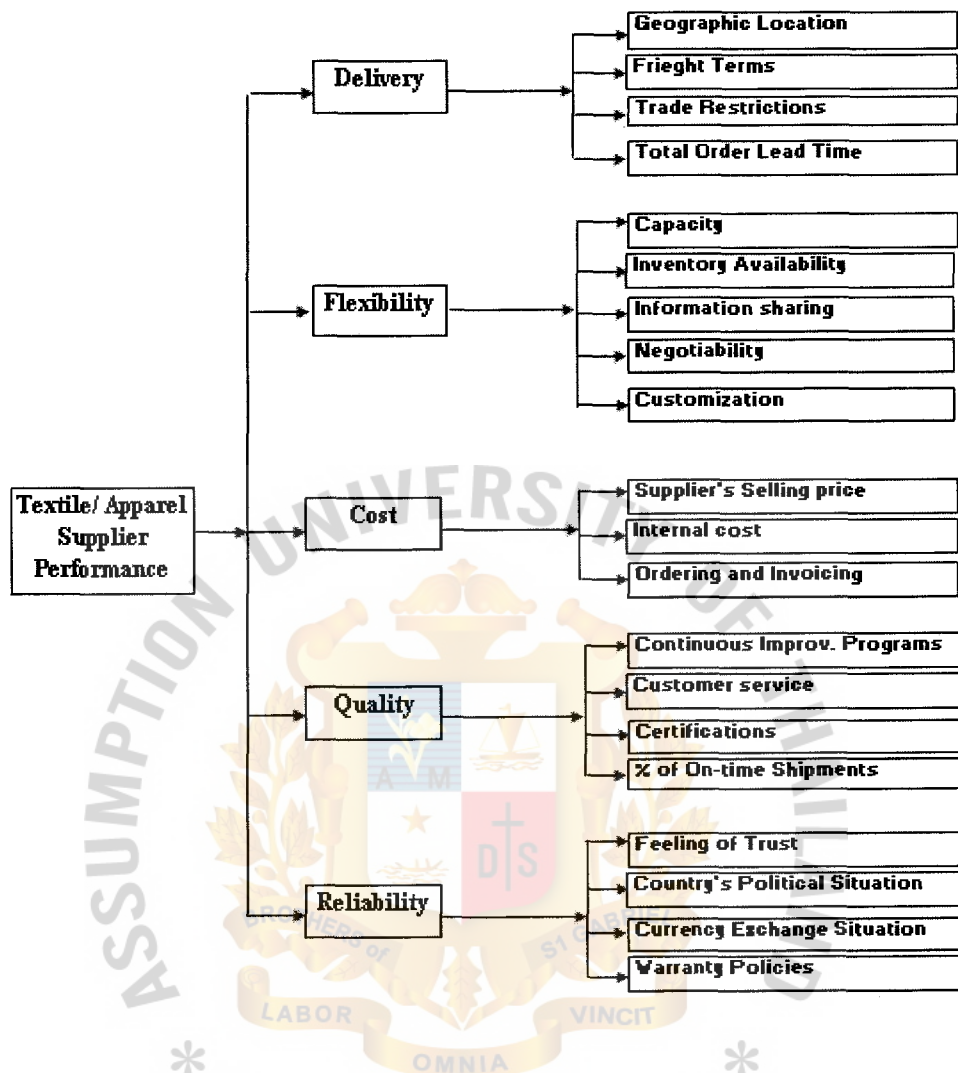


Figure 3.1: Teng and Jaramillo (2005) identify to group the factors for evaluation and selection suppliers in global and textile and apparel supply chains.

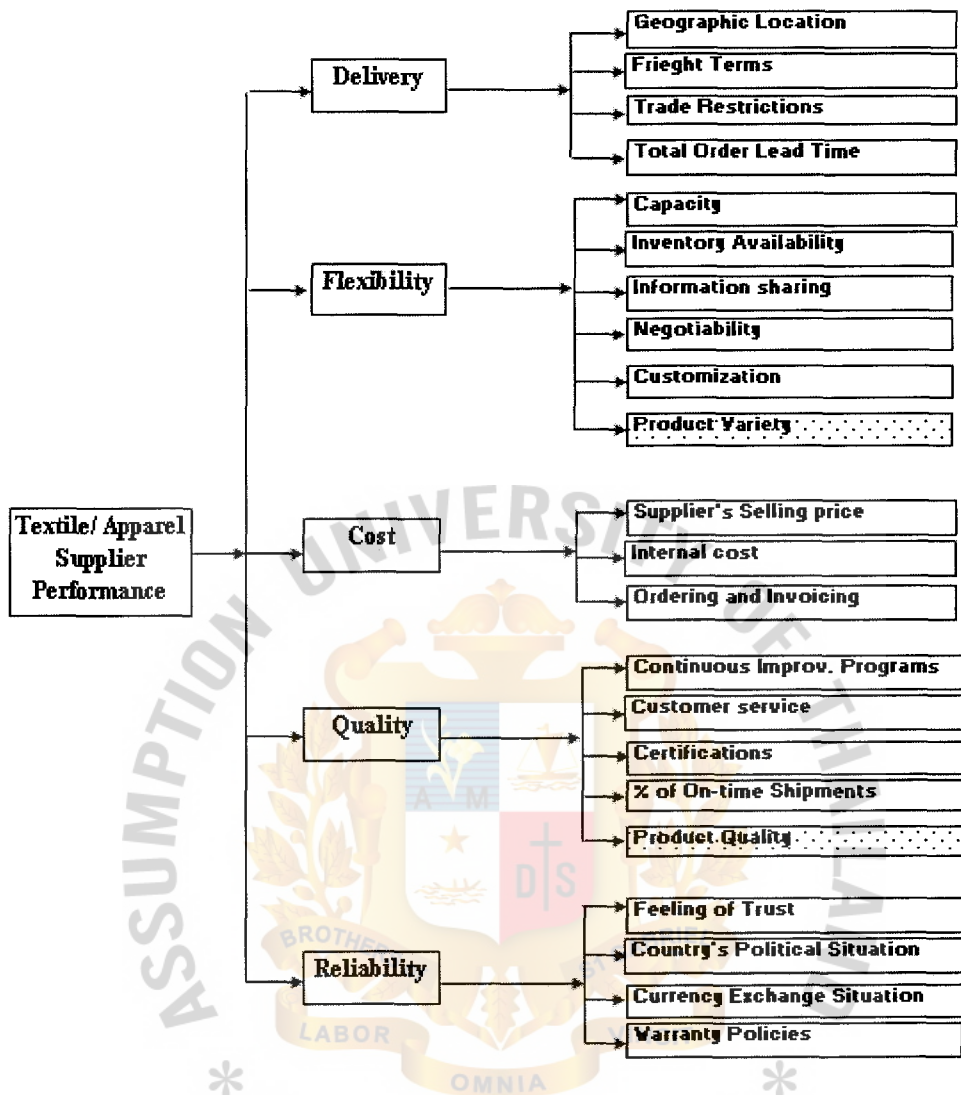


Source : Teng and Jaramillo (2005)

All the factors in Figure 3.1 are screened by the purchasing and sourcing staffs and branch manager. After discussion of criteria factors, therefore, some factors should be added; there are product varieties under the flexibility section, and quality of product under the quality section, as shown below in Figure 3.2.

Figure: 3.2

Showing the new variable added.



Product Variety will be added to the flexibility cluster since the buyers also look for the variety of material for making choices and trial. Sometimes, the customers do not have any idea about their new collection; the customers prefer to ask the suppliers to propose the variety of material to help them generate an idea. If the suppliers can offer variety of product, it also affects the performance of the company.

Product quality variable is also added to the quality cluster. The quality of raw materials or component itself should be considered since it is the tangible thing for proving the quality and it also affects the finished goods. The final product has to be tested and pass the standard of the customer's specification.

CHAPTER IV

RESEARCH METHODOLOGY

4.1 Methods of Research Used

Many technique used to collect data, and to build or validate theories (Rahim and Baksh , 2003; de Weerd-Nederhof, 2001; Eisenhardt 1989; Swartz and Boaden, 1997; Westbrook, 1995; Yin, 1994). According to Yin (1994), a case study is an empirical inquiry that investigates a contemporary phenomenon within its real life context when the boundaries between phenomenon and context are not clearly evident. Here, the methodology for this project is also the case study method since the current method of evaluation and selection supplier in this company and evidence to support the decision making are not clear. Moreover, the objective in this project is applying the supplier selection process within the company for determining the capability of existing suppliers' performance to turn them into key suppliers for improvement in the supplier's performance in real life work. Therefore the case study technique is a suitable research tool for this project. Simon et al., (1996) mention that a theoretical framework may be constructed prior to commencing study of the cases so that the data collection is designed to shed light on the model used. The theoretical framework in this project is constructed by using prior studies in the area, both in concept and industry. However, the methodology will be designed to fit the project, including data collection. Creswell (2003) describes three different approaches to data collection and analysis namely quantitative, qualitative and mixed methods.

The quantitative approach is one in which the researcher uses “measures in which numbers are used directly to represent the properties of something, to develop knowledge (Hair et al., 2003). The strategies employed include experiments and surveys where data are collected on instruments that produce statistical data.

For the qualitative approach, the researcher uses socially constructed meanings with the intent of developing a theory (Lee, 1999; Kaplan and Maxwell, 1994). Some of the strategies of enquiry that are used include words, pictures and ethnographies where a researcher collects open-ended data without assigning numbers directly (Hair

et al., 2003). Qualitative analysis helps researchers to understand and explain why people have different experiences.

The mixed methods approach is one in which the researcher bases knowledge claims on pragmatic groups (Creswell, 2003; Hair et al., 2003). In this case, a problem is identified for which there may be a range of possible solutions. The most appropriate solution must then be determined taking into consideration the specific requirements of the context under study. The mixed methods approach adopts strategies of enquiry that involve the collection of data in order to understand the situation that exists. Here data collection involves capturing numeric as well as textual information. In other words, both quantitative and qualitative methods are employed.

The approach that is adopted in this study is that of a case study using a mixed approach, where data is collected sequentially. The four phases of Shin and Danny (2008) and De Boer et al., (2001) are used in this case study (problem definition, formulation of criteria, pre-qualification of suitable suppliers, and final selection of ultimate supplier). Here the organization in question is a community that has identified a problem as a current problem caused by suppliers. In order to solve the problem, the procurement staff and manager must be involved in designing the solution. The initial step involved interviews with the procurement staff and manager to identify the specific problems. To define the way of solving problems, the community will be involved. Literature reviews were carried out to identify best practice for developing a supplier evaluation and selection measurement tool and critical factor to measure. From the analysis the critical supplier performance criteria for the organization was identified and agreed. Findings of this review were presented to procurement staff and manager to determine what may be the best or easy way for the organization. Based on this review, a prototype was developed for measuring supplier performance. It was then tested using specific company data. A questionnaire was launched to measure the supplier performance. The data collected generated the result. The findings of the test data processed by the tool were analyzed with the manager, and checking the output with real life experience. Once the tool and method were acceptable, the full database was fully implemented. The performance of the supplier base was measured by the capability of the existing

suppliers for turning them into key suppliers for improving the company's performance.

Microsoft Office Excel was used as a tool to generate the database, since it is the general application tool in the business enterprise. The database was simulated by using the equation with this tool. Davies (2000) states the characteristics and properties of a spreadsheet. Excel provides the following useful business assurance techniques:

- Arithmetical formulae to ensure consistency in calculations.
- Data sort, where data can be broken down into manageable segments and used to identify certain aspects of a large volume of data.
- Audit tools; precedents and dependents, where the interrelationship between certain sets of data can be identified and used as an assurance as to the logical creation of dependent data or prerequisite data.
- Auto filter, which allows data to be analyzed and grouped by different categories.
- Pivot tables and data mining, to probe the existence of underlying source data and recreation in graphical format.
- Creation of graphs and charts, that enable the reader to understand by means of pictures trends and forecasts.

According to the features of the Excel tool, it is suitable to simulate computing with equation setting.

4.2 Quality of the research design

To show the quality of the research design, tests of validity and reliability were established. The way of testing in a case study is different from a survey method since the case study does not quantitatively orient. Yin (1994) summarizes four design tests to judge the quality of the research design for a case study: construct validity, internal validity, external validity, and reliability. In this case the construct validity and reliability were used in combination to show the quality of research design.

Construct validity: Rahim and Baksh (2003) state that it is the process of establishing correct operational measures for the concepts being studied. Multiple sources of evidence were used in this project in order to meet the construct validity test. In this case, to establish operational measurement, a suitable statistical method and factor criteria were selected for applying to this study. Moreover, the multiple sources come from the primary data as the company documents and semi-structured interviews were combined to build the methodology for reaching a result and supporting the decision. The primary data was collected from company documents of supplier lists and details. Because of the lack of statistical records and documentary support, the interview process is part of collecting the data to support validity. Finally, before the final report was written and presented, a draft case study report had to be reviewed (Rahim and Baksh, 2003). The feedback was used to improve the case write-up. For improving the validity, this case study also followed the method which Rahim and Baksh mention. Moreover, reviewing the information had to be conducted by the expert staff as the procurement manager has experience in real work for increasing the validity.

Reliability: Ellram (1996) stated that the validity and reliability have been gained by using multiple sources of evidence, establishing a chain of evidence, having key interviewees review case study reports, and developing a case study database. The interviewee in this case study also has a part to support and help to perform a reliability check by reviewing the procedures, data and information. A check was made of the step of operational statistics and the result to see if exactly repeated it would result in the same findings. All procedures were documented and reviewed to ensure minimum error and bias, increasing the repeatability of this case.

4.3 Sample Design:

4.3.1 Sample size:

There are several of suppliers that ABC dealt with. However, we can divide these into four groups of supplier as below.

- 1) Fabric suppliers: 19 suppliers of knitted fabric and 33 suppliers of woven fabric. This category includes local and overseas suppliers.

- 2) Accessories suppliers: there are 133 suppliers for both local and overseas suppliers.
- 3) Sub-contractors for embroidery and printing: there are 17 suppliers. All suppliers in this category are local suppliers.
- 4) Finished goods and sub-contractors for producing garment: there are 65 local suppliers.

The total of all suppliers is 267 that ABC deals with.

The fabric suppliers will be central to this case study since fabric is the major material in the product. Moreover, the company spends the highest cost in this group of suppliers as 50 percentage of product. The fabric suppliers group has to be screened since some customers are active or non-active, before applying the supplier selection and evaluation method, and then determining the criteria factors for evaluation. The number of candidate suppliers remaining in fabric category after screening were 16 knitting suppliers and 19 woven suppliers who will be evaluated after the non-active suppliers were screened out.

4.3.1 Target respondents:

The fabric suppliers were used to in supplier evaluation and selection in this case. Therefore the respondents for this case study are managers and purchasing staff who handles in fabric category. The data and information from them was collected by using the mixed approach methodology.

4.4 Methods of Applying Evaluation and Selection of Suppliers

4.4.1 Apply Teng and Jarmillo's model

This section will trace Teng and Jarmillo's model in order to understand the way of generating the result, to see how this model works before going through the data analysis section.

The structure of Teng and Jarmillo's model is designed according to a hierarchical structure with several layers of decision-making activities. There are two layers.

- The first layer of the hierarchy is for the most critical areas which consist of five areas that include delivery, flexibility, cost, quality and reliability. It is also called clusters or the grouping factors. Each cluster has a weight and assigned by buyers according to their need.
- The second layer of the hierarchy consists of factors that have a significant effect on each cluster. Each factor will be also be weighted according to buyers' need.

The characteristics of the model are divided into two main characteristics.

1. The first characteristic is to obtain a dimensionless index of the result of running the model. The grade that each supplier receives on each factor will be divided by the desired value to obtain a dimensionless index that will be multiplied by its corresponding factor and cluster weight. The index used in this model to determine a supplier's performance is the total supplier score.
The score consists of five cluster scores (delivery, flexibility, cost, quality and reliability). A high cost score has a negative impact on the total supplier score.
2. The second characteristic, considering correlations between factors in the model, is not used for the sake of simplicity in the use of the model.

The index used in this model to determine a supplier's performance is the total supplier score. This score consists of five cluster scores, the scores for delivery, flexibility, quality, reliability and cost. It is important to note that a high cost score has a negative impact on the total score. The total score was calculated as in the equation below:

Total supplier score = (delivery score + flexibility score + quality score + reliability score – cost score).

To determine these cluster scores, we need to determine:

- A) The cluster weights in each cluster (C) : Delivery / Flexibility / Cost / Quality and Reliability
- B) The factor weights (K) that influences the cluster. The factor weights are used to calculate the factors' score inside each cluster. The equation index inside each cluster will be shown in the next section.

- C) The desired value (DV) and a V value that is computed by dividing a buyer provided score by the factor's DV value. It is to reflect the needs of a buyer or the company on the factors. In the other word, it is how the supplier meets the company's need in this factor. But refer to desired value (DV) in this case, the company will desire by taking from the average score of all supplier or it is the desired value average (DVG).

They stated that that pricing is not a sole factor in supplier selection and evaluation. Hence, the collected score of each cluster should be combined to be the total score for evaluation and selection of a supplier. The supplier who gets a high score in the highest weight of cluster will have a chance to get a high total score. However, the total supplier score will not be determined since there are other factors to be analyzed.

4.4.2 The criteria factors for selection and evaluation

The first cluster :Delivery

This cluster consists of geographic location, freight terms, trade restrictions and total order cycle time.

1.1 Geographic location (K_{gl}): represents the location from a logistics point of view.

There are 4 scales that determine location. Score (4) is represented by very close proximity; the suppliers are located in Bangkok, Samutprakarn and Samutsakorn. Close proximity for a supplier located in Thailand scores 3. Far away, with a supplier located in China is score 2. Very far with a supplier located in other countries is a score of 1.

1.2 Freight term (K_{ft}): refers to the favorability of shipping conditions and is associated with the supplier's level of responsibility over the shipping process. Moreover the supplier can take responsibility for the shipping process or is willing to do as the company requests. There are 4 scales: Excellent (score=4), Good (score=3), Fair (score=3) and Poor (score=1).

1.3 Trade restrictions (K_{tr}): refers to government restriction for a certain type of products in both sides of supply chain. Tariff and custom duties will be considered. In this factor, Teng and Jaramillo (2005) mention that a high score on this factor will have a negative influence on the delivery index. High trade restrictions (score=4), Moderate trade restriction (score=3), Low trade restriction (score=2) and Free trade agreement (score=1).

1.4 Total order lead time (K_{lt}): refers to the lead time from the moment a buyer places an order to the time the customer's designated site receives the ordered products. This factor will be determined in the rank of supplier performance. Since the fabric suppliers have two product lines (knitted fabric suppliers and woven fabric suppliers), the order lead time is different between them. The lead time of knitted fabric is usually higher than for woven fabric suppliers. Therefore, the rank of supplier performance is different.

For knitted fabric:

- Excellent with a total order lead time from 25-34 days (score=4)
- Good with a total order lead time from 35-44 days (score=3)
- Fair with a total order lead time from 45-54 days (score=2)
- Poor with a time beyond 54 days (score=1)

For woven fabric:

- Excellent with a total order lead time from 30-39 days (score=4)
- Good with a total order lead time from 40-49 days (score=3)
- Fair with a total order lead time from 50-59 days (score=2)
- Poor with a time beyond 59 days (score=1)

The delivery score will be calculated in an equation as below:

$$\text{Delivery index} = CD * [(K_{gl} * V_{gl}) + (K_{ft} * V_{ft}) - (K_{tr} * V_{tr}) + (K_{lt} * V_{lt})]$$

The second cluster : Flexibility

The flexibility cluster will be assigned into capacity, inventory availability, information sharing, negotiability, customization and product variety.

2.1 Capacity (K_c): to determine the flexibility to do with various size of order. In other words, the suppliers have the flexibility to produce the quantity the company requests. There are four scales: Very high (score=4), High (score=3), Acceptable (score=2) and Low (score=1).

2.2 Inventory availability (K_{iv}): Since most of the products are customized, the company cannot ask the supplier to keep the fabric at a certain level of safety stock. The company will determine this in terms of flexibility in booking a quantity of raw fabric in the promised period and quantity. There are four scales: Very high (score=4), High (score=3), Acceptable (score=2) and Low (score=1).

2.3 Information sharing (K_{is}): is concerned with information of new product launchings in terms of design, quality, functional, and price. Moreover, it consists of

production status, and ordering status that the suppliers are willing to share the information when the company asks for it. The scale is assigned into four scales: Very high (score=4), High (score=3), Acceptable (score=2) and Low (score=1).

2.4 Negotiability (K_n): is associated with the mutual trust existing between supply chain partners and is higher in long term relationships. It also means that the suppliers are willing to accept the condition in a contract and the condition in terms of payment. This category is evaluated according to the scales of Very high (score=4), High (score=3), Acceptable (score=2) and Low (score=1).

2.5 Customization (K_{cu}): to evaluate the supplier's ability to take an order with special characteristics. Since the special requests may require special machines or technology setups, this category favors small and medium size organizations with less complex production processes. Moreover, the supplier in the make-to-order production system will receive a good score in the evaluation. However the company will measure this by the ability of a supplier to fill the order as the company requests. There are four scales: Very high (score=4), High (score=3), Acceptable (score=2) and Low (score=1).

2.6 Product Variety (K_{pv}): to evaluate the supplier in terms of having variety of product design and new product innovation to offer. There are four scales: Very high (score=4), High (score=3), Acceptable (score=2) and Low (score=1).

The flexibility score will be calculated in an equation as below :

$$\text{Flexibility index} = CD * [(K_c * V_c) + (K_{iv} * V_{iv}) + (K_{is} * V_{is}) + (K_n * V_n) + (K_{cu} * V_{cu}) + (K_{pv} * V_{pv})]$$

The third cluster : Cost

The cost cluster is the one of a customer's considerations. In the global market, the sellers cannot resist that the cost is the customer's major consideration in global bidding. Therefore the supplier's selling price, internal cost and the cost of ordering and invoicing are the evaluation factors.

3.1 Supplier's selling price (K_{sp}): Most customers are searching for the less costly products. They have to take into account of cost of procuring from certain sources; whether they require air, ground or maritime shipments, which ultimately affect the final price of the product. Therefore the suppliers will be evaluated in term of price level. This factor will be evaluated as four scales: High price (score=4), Acceptable (score=3), Low price (score=2) and Very low price (score=1).

3.2 Internal cost (K_{ip}): In addition to the product price that a company has to pay for, other related costs such as transportation and quality must also be considered (rectification, waste, defects and plant visits). In the minimization of internal costs, the suppliers are capable of assuming or absorbing the entire cost. The factor will be given as four scales: High internal costs (score=4), Acceptable internal cost (score=3), Low internal costs (score=2) and Very low internal cost (score=1).

3.3 Ordering and invoicing (K_{oi}): it relates to the ease of order placing in terms of cooperation in processing the document in same way as buyers or at the buyers' request. In addition to the accuracy of information in the document and language, it is also important because it will affect the period of time to pay. This factor will be evaluated as four ratings: Excellent (score=4), Good (score=3), Fair (score=2) and Poor (score=1).

The cost score will be calculated as in the equation below :

$$\text{Flexibility index} = CD * [(K_{sp} * V_{sp}) + (K_{ip} * V_{ip}) - (K_{oi} * V_{oi})]$$

The fourth cluster : Quality

The quality cluster includes four factors that consist of continuous improvement, certifications, customer service, percentage of on time deliveries, and product quality.

4.1 Continuous improvement (K_{ip}): could be defined as the continuous enhancement in lead times, conformity and reliability of deliveries. It also includes improvement of quality of product, communication and willingness to improve at the point of customers' complaints or requests. The scales are assigned as below.

Score = 4 High : the supplier constantly presents signs of improvements

Score = 3 Moderate : the supplier occasionally presents signs of improvements

Score = 2 Acceptable : the supplier rarely presents sings of improvements

Score = 1 Poor : the supplier never presents signs of improvements

4.2 Certificate factor (K_{cs}): The certifications factor is for the recognition of the supplier's quality level. Buyers may use supplier certifications as a quality assurance instrument that will determine whether or not some suppliers are capable to follow standards in the industry. Since the target market of the company is Europe, the Okotex, EU flower and Eco-tex are concerned and at least a certificate of social conduct should be received. The buyers can give the scores as below:

Score = 4 Very high: the supplier has Okotex certification, Social Code of Conduct and other supplier certifications.

Score = 3 High: the supplier has Okotex certification and Social Code of Conduct but no other supplier certifications.

Score = 2 Acceptable: the supplier has Social Code of Conduct certifications.

Score = 1 Poor: the supplier does not have any certification.

4.3 Customer service (K_{cs}): the interaction with suppliers has an important role in the smooth flow of goods and information. Moreover, customer service shows a supplier's effectiveness to respond to customer requests or complaints. The scales are designed as below:

Score = 4 Excellent : the supplier always attended complaints or requests promptly.

Score = 3 Good : the supplier attended complaints or requests promptly most of the times.

Score = 2 Fair : the supplier attended complaints or requests promptly occasionally.

Score = 1 Poor : the supplier never attended complaints or requests promptly.

4.4 % on-time deliveries (K_{ot}): it is one key factors in supplier quality since some obstacles may affect on-time deliveries, such as in-transit delays. Other difficulties in on time deliveries may be customs' inefficiencies, quota limitations and inefficient paperwork processes. This category is evaluated as follows.

Score = 4 Very high : more than 95% of shipments are delivered on time.

Score = 3 High : 90-94% of shipments are delivered on time.

Score = 2 Moderate : 85-89% of shipments are delivered on time.

Score = Low :less than 85 %of shipments are delivered on time.

4.5 Product quality (K_{pq}): It shows the quality level of the product at the customers' standard and request. Although the certification factor can recognize the supplier's quality level, the quality of product is important. The quality of raw material also affects the final product. The scales are assigned as score 4 = High, score 3 = Moderate, score 2 = Acceptable, score 1 = Poor.

The quality score will be calculated as in the equation below:

$$\text{Quality index} = CD * [(K_{ip} * V_{ip}) + (K_{cs} * V_{cs}) + (K_{ct} * V_{ct}) + (K_{ot} * V_{ot}) + (K_{pq} * V_{pq})]$$

The fifth cluster : Reliability

This is concerned with feelings of trust, a country's political situation, the currency exchange situation and warranties.

5.1 Feeling of trust (K_t): The feeling of trust is evaluated according to the buyer's perception of a given supplier. The feeling of trust is determined by an on-going

partnership between supply chain partners and performance evaluations of supplier over the years. The evaluation will be divided into four levels: Very high (score=4), High (score=3), Moderate (score=2) and Low (score=1).

5.2 Country's political situation (K_{ps}): lies in the buyer's concerns about potential disruptions in the flow of goods that are mostly caused by external situations beyond the supplier's control. Therefore the evaluation for this factor includes four ratings as below.

Score = 4 Excellent : the supplier's country of origin exhibits good short and long term stability and there is absolutely no distracting of supply chain operations due to the country's political situation.

Score = 3 Good : the supplier's country of origin exhibits good stability in the short and long term.

Score = 2 Fair : the supplier's country of origin exhibits some concerns regarding political stability. Some concerns about disruptive events may exist in the supply chain operations.

Score = 1 Poor : the supplier's country of origin exhibits serious concerns regarding political stability and disruptive events in supply chain activities.

5.3 Currency exchange situation (K_{ce}): This factor is more concerned with the overseas suppliers. The suppliers in the countries with aggressive devaluation policies find their products very competitive in international markets. On the other hand, companies in the countries with revaluated currencies find their products less competitive in international markets. The currency will also affect with the cost of products. It can relate with the currency rate or type agreed between suppliers and buyers. The buyer determines the degree of favorability in four scales: Very favorable (score=4), Favorable (score=3), Neutral (score=2), and Non favorable (score=1).

5.4 Warranty (K_{wp}): Warranties are associated with on time deliveries. Buyers may expect some rebates on late deliveries, penalties for late deliveries or charge back. It also includes quality of product (defect and out of standard). The evaluation is similar to the previous factor.

Score = 4 Very favorable: takes full responsibility on non-conformities and offers rebates on late shipments.

Score = 3 Favorable: takes partial responsibility on non-conformities or offers rebates when deliveries are not received on time.

Score = 2 Neutral: only takes partial responsibility on non-conformities.

Score = 1 Non Favorable: it does not take any responsibility on non-conformities or late shipment.

The reliability score will be calculated in the equation as below :

$$\text{Reliability index} = CD * [(K_t * V_t) + (K_{fe} * V_{fe}) + (K_{tr} * V_{tr}) + (K_{wp} * V_{wp})]$$

The ranking and scale in each factor will be used in the questionnaire to find out the score of each supplier for evaluation and selection, and applied in the supplier performance evaluation matrix. Moreover the knitted suppliers and woven suppliers will be evaluated separately since there is a difference in lead time of delivery. The lead time of woven fabric is longer than knitted fabric. We cannot use the same scale in evaluation.

4.5 Data collection

The total score of each supplier will come from the questionnaire. The questions will be set according to the explanation in the topic of “The criteria factors for selection and evaluation” in 4.1. The procurement staff and manager will make the evaluation and give the ranking and scale for each factor. The questionnaire will be distributed into two sets since this case study will be applied in the fabric categories (knitted fabric and woven fabric) as mentioned above. After collecting the database, the supplier performance evaluation matrix table will be used to apply the database.

4.6 The supplier performance evaluation table matrix

The following table 4.1 shows the matrix table that is applied, from Teng and Jaramillo’s matrix table. It is an easy way for the buyers/users use to evaluate and select the supplier by considering the major factors involved in the supply chain operations. This table is also used in this project. The buyers/ users have to give the weight of each cluster and factor at the same time while the scores of each factor have to be collected. After that, all the quantity information will be calculated in the equation that has been set.

Table: 4.1: The decision matrix table

Proposed decision matrix for supplier selection

Cluster	Weight	Factors	Weight	DVG	DV	Supplier A	Supplier B
Delivery	C_D	Geographic location	K_{gl}				
		Freight terms	K_{ft}				
		Trade restrictions	K_{tr}				
		Total order lead time	K_{lt}				
		Delivery index = $CD[(K_{gl} \cdot V_{gl})+(K_{ft} \cdot V_{ft})+(K_{tr} \cdot V_{tr})+(K_{lt} \cdot V_{lt})]$					
Flexibility	C_F	Capacity	K_C				
		Inventory availability	K_{iv}				
		Information sharing	K_{is}				
		Negotiability	K_n				
		Customization	K_{cu}				
		Product Variety	K_{pv}				
Flexibility index = $CF[(K_C \cdot V_C)+(K_{iv} \cdot V_{iv})+(K_{is} \cdot V_{is})+(K_n \cdot V_n)+(K_{cu} \cdot V_{cu})+(K_{pv} \cdot V_{pv})]$							
Cost	C_C	Supplier's selling price	K_{sp}				
		Internal cost	K_{ic}				
		Ordering and invoicing	K_{oi}				
		Cost index = $CC[(K_{sp} \cdot V_{sp})+(K_{ic} \cdot V_{ic})-(K_{oi} \cdot V_{oi})]$					
Quality	C_Q	Continuous improv. Programs	K_{ip}				
		Certifications	K_{cs}				
		Customer service	K_{ct}				
		Percent of on-time shipments	K_{ot}				
		Product quality	K_{pq}				
		Quality index = $CQ[(K_{ip} \cdot V_{ip})+(K_{cs} \cdot V_{cs})+(K_{ct} \cdot V_{ct})+(K_{ot} \cdot V_{ot})+(K_{pq} \cdot V_{pq})]$					
Reliability	C_R	Feeling of trust	K_t				
		Country's political situation	K_{ps}				
		Currentcy exchange situation	K_{oe}				
		Warranty policies	K_{wp}				
		Reliability index = $CR[(K_t \cdot V_t)+(K_{ps} \cdot V_{ps})+(K_{ce} \cdot V_{ce})+(K_{wp} \cdot V_{wp})]$					
Total score		delivery + flexibility score + quality score + reliability score -cost score					
Notes :		DV = desired value					

Source : Teng and Jaramillo's matrix table(2005)

CHAPTER V

DISCUSSION OF RESULTS AND CONCLUSION

In this chapter, the researcher shows the results with analysis, including conclusion, of the database.

5.1 The discussion of results.

This section will consider an analysis of the result by a combination of qualitative and quantitative information. The primary purpose of this case study is to apply the supplier evaluation and selection method to determine the capability of the existing suppliers' performance so as to turn them into key suppliers for improving the company's performance. To achieve the purpose, Teng and Jarmillo's 2005 model of supplier evaluation and selection was selected for simulation to reduce the number of

the supplier base by evaluating the existing supplier performance and selection since their model fits with the company business and the literature review.

The target supplier group for implementation in the model is the fabric group with 35 suppliers (after screening out). This group is also classified into 2 sub-groups as knitted fabric group with 16 suppliers and woven fabric group with 19 suppliers. In the initial step, the procurement staff and manger decide the weight for each cluster and factor in Table 4.1 (The decision matrix table). The knitted supplier and woven supplier use the same weight for evaluation. The procurement staff and manger give the highest weight with 0.30 for quality followed by delivery and cost with score 0.20. For flexibility and reliability they give the equal weight as 0.15. The quality cluster is emphasized according to the company direction as already mentioned in Chapter 2, and quality is the main factor that the company wants to improve in the suppliers' performance. Moreover, they have to make decisions for giving the factors' weight inside each cluster as in Table 5.1 in the weight column.

Delivery cluster: total order lead time is the most important factor with weight 0.40 since this factor is out of control by the company itself. Moreover, the impact of this factor is the highest impact in the performance; it will affect the lead time in the chain and customer satisfaction.

Flexibility cluster: capacity, inventory availability, information sharing and negotiability will allocate in the same weight with 0.20 for this important factor since it will affect the operational part. Customization and product variety are given less weight as they are minor factors.

Cost cluster: the highest weight given is the supplier's selling price with 0.50 since the product cost itself is the high proportion in determining decision making.

Quality cluster: all factors in this cluster are equal weight and equal importance with 0.20.

Reliability cluster: The warranty policies are the most important factor since the company does not have a special relationship with the supplier. The warranty policies can help to prove the reliability of a supplier.

After the procurement staff and manger allocate the weight in each cluster and factor, the score of each supplier will be collected by using the questionnaire for getting the numeric data. The next section will present the result after generating the data with formulation in Microsoft Office Excel.

5.2 The evaluation and analysis of results for Knitted Suppliers

After the data is collected, it will be applied in the matrix table as in the sample in Table 5.1. The methodology for calculation was explained in chapter 4 in the Apply Teng and Jarmillo's model topic. Moreover, the summary supplier evaluation and selection of total score for knitted suppliers will be provided in Table 5.2, and Figure 5.1 presents the evaluation of 16 suppliers in according to the company requirement.

Table: 5.1: The sample decision matrix for supplier selection

Proposed decision matrix for supplier selection

Cluster	Weight	Factors	Weight	DVG	DV	SUP	Score /DV	SUP	Score /DV	SUP	Score /DV		
						A		G		L			
Delivery	C _D	0.20	Geographic location	K _{gl}	0.20	4.00	4.00	4.00	1.00	4.00	1.00	4.00	1.00
			Freight terms	K _{ft}	0.20	4.00	4.00	4.00	1.00	4.00	1.00	4.00	1.00
			Trade restrictions	K _{tr}	0.20	1.25	1.25	1.00	0.80	1.00	0.80	1.00	0.80
			Total order lead time	K _{lt}	0.40	2.69	2.69	3.00	1.12	4.00	1.49	3.00	1.12
		Delivery index = $CD[(K_{gl} \cdot V_{gl})+(K_{ft} \cdot V_{ft})-(K_{tr} \cdot V_{tr})+(K_{lt} \cdot V_{lt})]$						0.14		0.17		0.14	
Flexibility	C _F	0.15	Capacity	K _C	0.20	2.69	2.69	4.00	1.49	4.00	1.49	3.00	1.12
			Inventory availability	K _{ia}	0.20	2.44	2.44	3.00	1.23	2.00	0.82	3.00	1.23
			Information sharing	K _{is}	0.20	2.19	2.19	3.00	1.37	3.00	1.37	3.00	1.37
			Negotiability	K _n	0.20	2.50	2.50	2.00	0.80	3.00	1.20	2.00	0.80
			Customization	K _{cu}	0.10	2.63	2.63	3.00	1.14	3.00	1.14	3.00	1.14
			Product Variety	K _{pu}	0.10	2.63	2.63	4.00	1.52	3.00	1.14	4.00	1.52
Flexibility index = $CF[(K_C \cdot V_C)+(K_{iv} \cdot V_{iv})+(K_{is} \cdot V_{is})+(K_n \cdot V_n)+(K_{cu} \cdot V_{cu})+(K_{pu} \cdot V_{pu})]$						0.19		0.18		0.18			
Cost	C _C	0.20	Supplier's selling price	K _{sp}	0.50	3.06	3.06	4.00	1.31	3.00	0.98	3.00	0.98
			Internal cost	K _{ic}	0.30	2.19	2.19	2.00	0.91	3.00	1.37	2.00	0.91
			Ordering and invoicing	K _{oi}	0.20	2.81	2.81	3.00	1.07	3.00	1.07	3.00	1.07
Cost index = $CC[(K_{sp} \cdot V_{sp})+(K_{ic} \cdot V_{ic})-(K_{oi} \cdot V_{oi})]$						0.14		0.14		0.11			
Quality	C _Q	0.30	Continuous improv. Programs	K _{ip}	0.20	2.25	2.25	3.00	1.33	2.00	0.89	3.00	1.33
			Certifications	K _{cs}	0.20	2.50	2.50	3.00	1.20	3.00	1.20	3.00	1.20
			Customer service	K _{ci}	0.20	2.63	2.63	2.00	0.76	3.00	1.14	3.00	1.14
			Percent of on-time shipments	K _{oi}	0.20	2.25	2.25	3.00	1.33	3.00	1.33	3.00	1.33
			Product quality	K _{pq}	0.20	2.31	2.31	3.00	1.30	3.00	1.30	3.00	1.30
Quality index = $CQ[(K_{ip} \cdot V_{ip})+(K_{cs} \cdot V_{cs})+(K_{ci} \cdot V_{ci})+(K_{oi} \cdot V_{oi})+(K_{pq} \cdot V_{pq})]$						0.36		0.35		0.38			
Reliability	C _R	0.15	Feeling of trust	K _t	0.20	2.50	2.50	3.00	1.20	3.00	1.20	3.00	1.20
			Country's political situation	K _{ps}	0.20	2.94	2.94	3.00	1.02	3.00	1.02	3.00	1.02
			Currency exchange situation	K _{ce}	0.20	3.00	3.00	3.00	1.00	3.00	1.00	3.00	1.00
			Warranty policies	K _{wp}	0.40	2.50	2.50	2.00	0.80	3.00	1.20	3.00	1.20
Reliability index = $CR[(K_t \cdot V_t)+(K_{ps} \cdot V_{ps})+(K_{ce} \cdot V_{ce})+(K_{wp} \cdot V_{wp})]$						0.14		0.17		0.17			
Total score							0.68		0.73		0.75		
Notes : DV = desired value													

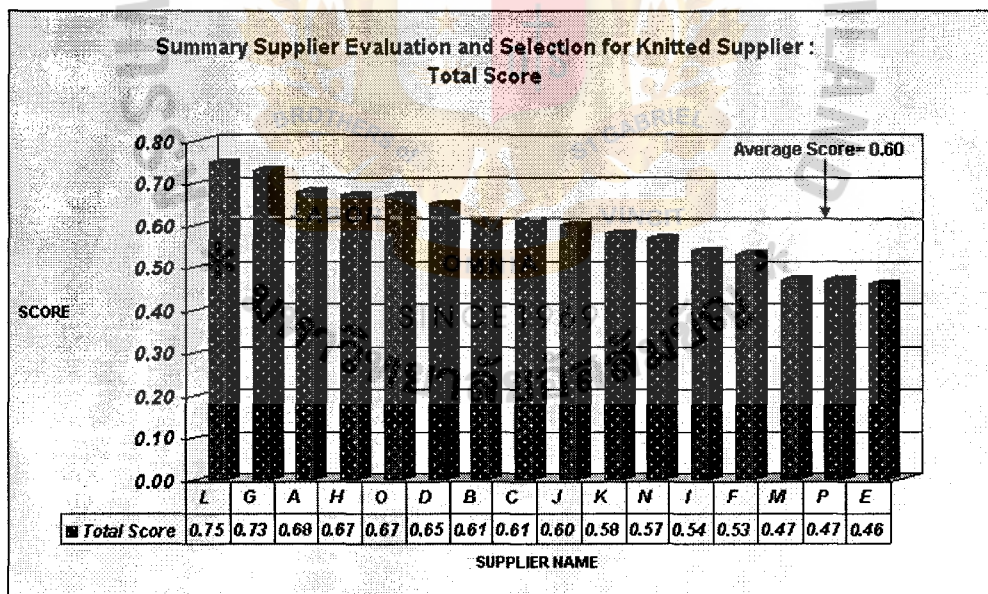
Finally, the company has a clearer point of view for making the decision in selecting the suppliers. Looking at Table 5.2, and Figure 5.1, the total score is shown in descending order. The result is that Supplier "L" gets the highest performance score

with 0.75. The following suppliers are Supplier “G” with a total score 0.73 as second choice, and Supplier “A” as third choice with a total score 0.68.

Table: 5.2: The Summary of total score for Knitted Suppliers

Supplier	Delivery	Flexibility	Cost	Quality	Reliability	Total Score
L	0.14	0.18	0.11	0.38	0.17	0.75
G	0.17	0.18	0.14	0.35	0.17	0.73
A	0.14	0.19	0.14	0.36	0.14	0.68
H	0.17	0.12	0.05	0.28	0.16	0.67
O	0.11	0.17	0.08	0.33	0.14	0.67
D	0.11	0.17	0.10	0.33	0.16	0.65
B	0.14	0.17	0.17	0.30	0.17	0.61
C	0.14	0.14	0.12	0.32	0.13	0.61
J	0.11	0.16	0.14	0.30	0.17	0.60
K	0.17	0.13	0.14	0.30	0.13	0.58
N	0.11	0.14	0.09	0.25	0.17	0.57
I	0.11	0.16	0.10	0.25	0.13	0.54
F	0.08	0.13	0.14	0.30	0.17	0.53
M	0.07	0.13	0.12	0.25	0.13	0.47
P	0.07	0.12	0.11	0.25	0.13	0.47
E	0.11	0.13	0.15	0.25	0.12	0.46
Average Score	0.12	0.15	0.12	0.30	0.15	0.60

Figure: 5.1: The Summary of total score for Knitted Suppliers



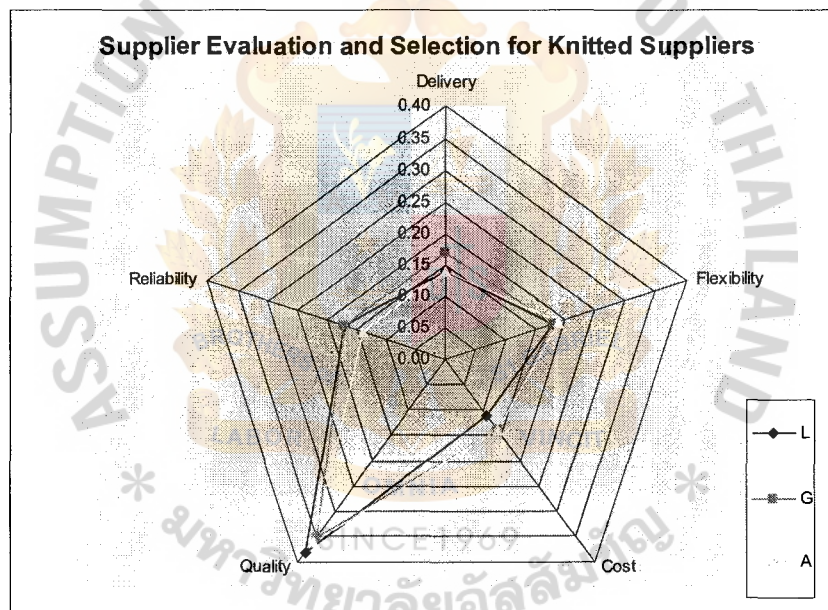
To keep the concept of multiple sourcing, the company will still keep in contact with more than one supplier for protection against the risk of times of shortages due to failure at a supplier’s plant. Thus, the average score has to be seen as a standard score for reducing the supplier base. Since the average of the total scores is 0.60, the suppliers with a score below 0.60 means they have an out of standard performance. Hence, the top three will be selected as the initial key supplier group for developing a

buyer and supplier relationship program. On the other hand, the company still connects with the rest of the group for sharing the risk of an unsuccessful buyer and supplier relationship program from the top three suppliers. Moreover, the company can investigate the weakness of the top three suppliers. The company can narrow the scope to look at each point of the three suppliers from Table 5.3 and Figure 5.7

Table: 5.3: The Summary of total scores for Knitted Suppliers for Top Three Suppliers

Summary Supplier Evaluation and Selection for Knitted Suppliers : Total Score						
Supplier	Delivery	Flexibility	Cost	Quality	Reliability	Total Score
L	0.14	0.18	0.11	0.38	0.17	0.75
G	0.17	0.18	0.14	0.35	0.17	0.73
A	0.14	0.19	0.14	0.36	0.14	0.68

Figure: 5.7: The Summary of total score for Knitted Suppliers for Top Three Suppliers



Supplier “L” is the first priority with the highest total score of 0.75. However, the weak point of supplier “L” is delivery only. The weaknesses of supplier “G” are cost and quality. Supplier “A” has to improve all factors except the flexibility factors. To look deep down inside the cluster of each supplier, the company can define which factor gets the low score that affects the total score index. For instance, the weakness of supplier “L” is in the delivery cluster in Table 5.4: this supplier gets the lowest score in the total order lead time factor. Referring to the geographic location, freight terms and trade restriction; all three suppliers get the same score. The weakness point

is total order lead time. It is possible to adjust this factor if the company creates a long term relationship and discussion with the supplier.

Table: 5.4: The Decision Matrix Table for Knitted Suppliers for Top Three Suppliers

Proposed decision matrix for supplier selection

Cluster	Weight	Factors	Weight	DVG	DV	SUP	Score /DV	SUP	Score /DV	SUP	Score /DV	
						A		G		L		
						1		7		12		
Delivery	C ₀	Geographic location	K _{g1}	0.20	4.00	4.00	4.00	1.00	4.00	1.00	4.00	1.00
		Freight terms	K _{f1}	0.20	4.00	4.00	4.00	1.00	4.00	1.00	4.00	1.00
		Trade restrictions	K _r	0.20	1.25	1.25	1.00	0.80	1.00	0.80	1.00	0.80
		Total order lead time	K _{lt}	0.40	2.69	2.69	3.00	1.12	4.00	1.49	3.00	1.12
Delivery index = CD[(K _{gl} *V _{gl})+(K _{fr} *V _{fr})-(K _{tr} *V _{tr})+(K _{lt} *V _{lt})							0.14		0.17		0.14	

The next section is the evaluation and analysis for Woven Suppliers.

5.3 The evaluation and analysis of results for Woven Suppliers

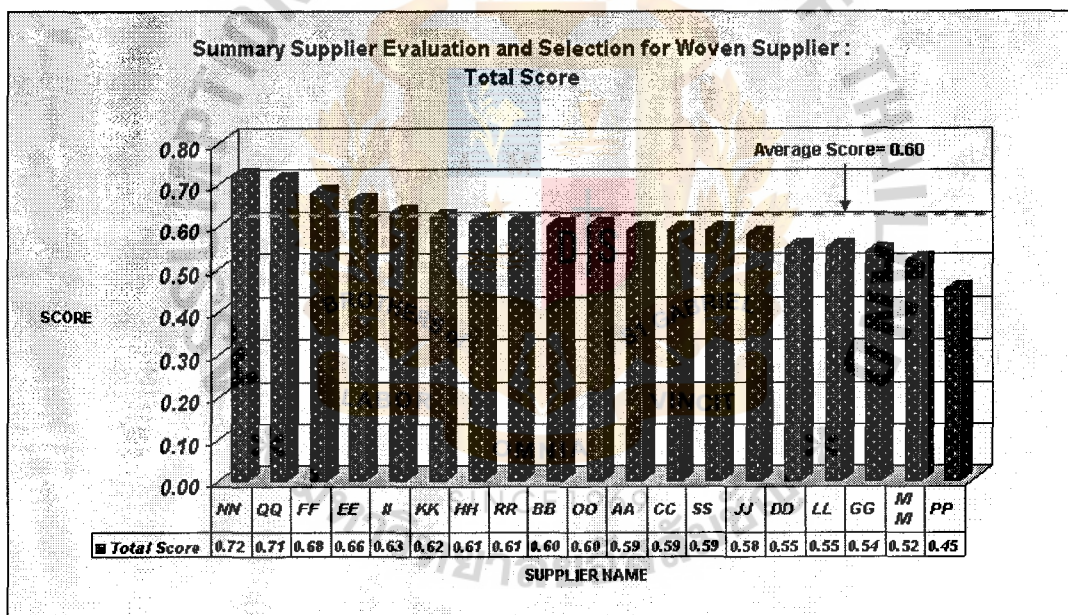
Data of 19 Woven Suppliers was collected and applied the same way as for Knitted fabric. The summary scores in evaluation and selection in Table 5.5 and Figure 5.8 shows the result as below. Reference to Table 5.3 and Figure 5.8 shows supplier “NN” in the first order with the highest total score of 0.72, follow by supplier “QQ” with a score 0.71, and the third order is supplier “FF” with a score of 0.68. The average of total scores is 0.60 as standard score: a supplier who gets a score of 0.60 or above is still connected to the company to share the business risk.

Table: 5.5: The Summary of total scores for Woven Suppliers

Summary Supplier Evaluation and Selection for Knitted Supplier :Each Cluster

Supplier	Delivery	Flexibility	Cost	Quality	Reliability	Total Score
NN	0.19	0.14	0.09	0.33	0.15	0.72
QQ	0.19	0.16	0.12	0.33	0.15	0.71
FF	0.12	0.18	0.15	0.35	0.18	0.68
EE	0.12	0.16	0.12	0.35	0.15	0.66
II	0.11	0.15	0.08	0.30	0.15	0.63
KK	0.12	0.15	0.07	0.28	0.15	0.62
HH	0.11	0.18	0.10	0.28	0.15	0.61
RR	0.19	0.11	0.12	0.28	0.15	0.61
BB	0.09	0.17	0.13	0.33	0.15	0.60
OO	0.06	0.19	0.13	0.33	0.15	0.60
AA	0.09	0.20	0.16	0.30	0.16	0.59
CC	0.12	0.15	0.13	0.30	0.15	0.59
SS	0.19	0.11	0.12	0.25	0.15	0.59
JJ	0.12	0.13	0.10	0.28	0.15	0.58
DD	0.09	0.15	0.13	0.30	0.15	0.55
LL	0.12	0.13	0.13	0.28	0.15	0.55
GG	0.11	0.13	0.10	0.25	0.15	0.54
MM	0.09	0.13	0.13	0.28	0.15	0.52
PP	0.02	0.14	0.13	0.30	0.14	0.45
Average Score	0.12	0.15	0.12	0.30	0.15	0.60

Figure: 5.8: The Summary of total scores for Woven Suppliers

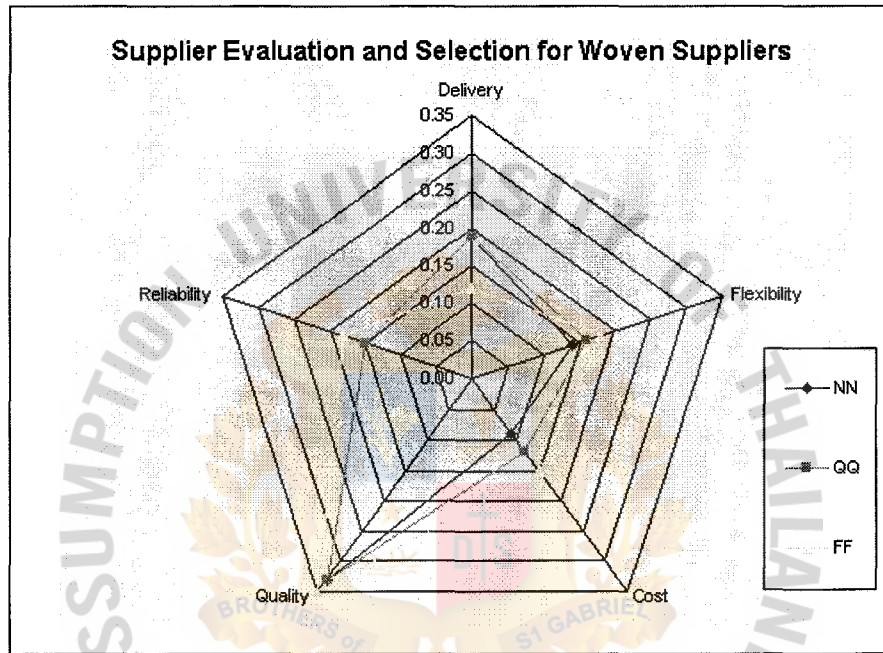


By the way, the company also looks at the weakness point for possible adjustment. The weakness of supplier “NN” is flexibility cluster and gets a score less than supplier “FF” and “QQ”, as Table 5.5 and Figure 5.9 show. The weakness of supplier “QQ” is the cost factor. “FF” supplier gets the lowest score, in delivery and cost.

Table: 5.5: The Summary of total scores for Woven Suppliers of Top Three Suppliers

Summary Supplier Evaluation and Selection for Woven Suppliers : Total Score						
Supplier	Delivery	Flexibility	Cost	Quality	Reliability	Total Score
NN	0.19	0.14	0.09	0.33	0.15	0.72
QQ	0.19	0.16	0.12	0.33	0.15	0.71
FF	0.12	0.18	0.15	0.35	0.18	0.68

Figure: 5.9: The Summary of total scores for Woven Suppliers of Top Three Suppliers



To look deep down inside the cluster of each supplier, the company can define which factor gets the low score that affects the total score index. For instance, “NN” supplier’s weakness is in the flexibility cluster, and the company can thoroughly investigate the flexibility cluster in Table 5.6.

Table: 5.6: The Decision Matrix Table for Woven Suppliers for Top Three Suppliers

Proposed decision matrix for supplier selection : Woven Suppliers

Cluster	Weight	Factors	Weight	DVG	DV	SUP FF	Score /DV	SUP NN	Score /DV	SUP QQ	Score /DV	
Flexibility C _f	0.15	Capacity	K _C	0.20	2.26	2.26	3.00	1.33	2.00	0.88	3.00	1.33
		Inventory availability	K _{Iu}	0.20	2.26	2.26	3.00	1.33	2.00	0.88	3.00	1.33
		Information sharing	K _{Is}	0.20	2.05	2.05	3.00	1.46	2.00	0.97	2.00	0.97
		Negotiability	K _n	0.20	2.58	2.58	2.00	0.78	3.00	1.16	3.00	1.16
		Customization	K _{cu}	0.10	2.68	2.68	3.00	1.12	3.00	1.12	1.00	0.37
		Product Variety	K _{pu}	0.10	2.53	2.53	3.00	1.19	1.00	0.40	2.00	0.79
Flexibility index = CF((Kc *Vc)+(Kiv*Viv)+(Kis*Vis)+(Kn*Vn)+(Kcu*Vcu)+(Kpu*							0.18		0.14		0.16	

The weakness points of supplier “NN” is in the flexibility cluster: all points are weak points except negotiability and customization. Some factors are difficult to adjust, such as customization and product variety. If in this factor the supplier does not have new technology or machinery to support the making of varieties of products, it is difficult to adjust this point. If the nature of suppliers emphasis is on producing the mass product, it is difficult to change their nature. For capacity, information sharing and product variety factor can be improved, and the company can start to discuss with this supplier the possibility to improve their weakness point. Another point is product variety, this factor has to be discussed between buyer and supplier for the possibility of making the more product variety. If it is impossible to improve, the company can be use the second and third supplier. By the way, that is a minor factor on which the company makes a decision to select the supplier: we have to look at the supplier’s total performance. Whatever, the weak point of key suppliers, these can be improved. The company can intend to discuss the weakness points with these three suppliers so as to improve their performance with continuous improvement.

5.4 Conclusions

Suppliers are the important part of supply chain and are in the downstream side. The operation or any activities in the downstream will impact on all activities and the final product. Therefore to select the right suppliers, the company can achieve the benefit more than the economic value. The procurement staffs of ABC Company select the supplier by using their judgment based on experience. The suppliers are treated at the same level of relationship. After investigating the problem, there are several problems which occur from the suppliers such as quality, delivery, cost and unwillingness to cooperate to solve the problem. Based on the experience and the literature review, the company assumed that the relationship with suppliers can lead to benefit and help to reduce the problem. Sameer and Samad (2008) state that one bad relationship can lead to a missed on-time delivery, lost customer and possibly even market share. It will leads to the questions “Who are the best suppliers to be selected to be key suppliers?” Van (2000) also claims that “what conditions and qualifications are the best- in-class which suppliers should meet” is an important question in supply base management, thus highlighting management of supply performance as a key issue. There are several methods to use for measuring the performance. The method of the supplier

evaluation model should be selected as suitable for the company direction and type of product and industry. Teng and Jaramillo's model was selected for use in this study as a standard tool for getting the numeric data to support decision making to evaluate and select the suppliers. The supplier base in the fabric category in ABC Company was selected to study for applying the supplier evaluation and selection method. The fabric supplier category divided into two categories, both of them (knitted fabric and woven fabric) were evaluated in this case study. The total numbers of suppliers in this category is 19 suppliers in the knitted category and 33 suppliers in the woven category. After the company knows the exact total number of supplier, the company has to screen out the non-active accounts before implementing the supplier evaluation and selection method. Lastly, the 16 suppliers out of 19 in knitted fabric and 19 suppliers out of 33 in woven fabric, were implemented in this case study.

To summarize. The result in the analysis part found that the suppliers "L", "G" and "A" will be selected to build the relationship for the knitted fabric supplier. For the woven suppliers there is another group with suppliers "NN", "FF" and "QQ". The suppliers in each group produces the same type of product. For the rest of the suppliers in each group, the supplier who gets a score the above standard performance will still be kept to do business with for sharing the risk. Both the two groups will be turned from existing supplier into being key suppliers in order to develop the relationship, since the company hopes that it can help to solve currently problem and achieve benefits from relationship.

CHAPTER VI

LIMITATIONS AND RECOMMENDATIONS

In this chapter, research limitations and recommendation will be discussed.

6.1 Limitations

The number of respondents who filled in the questionnaire is two persons. The bias of the number of respondent in the questionnaire for this case study is zero since the staffs in procurement of fabric category has only one person with one branch manager.

However, the problem still occurred during collecting the data to support producing a score. The company does not have the record of some information such as delivery dates, and some information is not well organized so it was difficult to find or was unavailable.

Time constraint was also a problem; to find the same free time for everybody was difficult. Time to explain the information in this case study was required before the start and at every step. The respondents needed to understand the advantage and details in this case study including method and factor criteria.

6.2 Recommendations

6.2.1 Supply Base Management

Referring to supply base management in the concept of relationships, the various literatures emphasized the relationship between buyers and suppliers. New research by Thomas Choi (2006), professor of supply chain management at the W.P. Carey School of Business, suggests that examining relationships between a buying company's suppliers can yield valuable information. How effectively the companies work together has a significant impact on the buyer's procurement and manufacturing success, and ultimately its bottom line. In his new exploration, the buyers need to pay attention to supplier-supplier relationship. He implies that "Because of the reduced size of the supplier base, many companies now outsource their design activities and may ask two or more suppliers to work together in new product development. Suppliers are competitors, but they have to collaborate sometimes". He also states that the suppliers have to wear different hats and behave differently depending on what the situation calls for.

According to Choi's exploring, his idea can be applied in a real working situation. For example, in the case of circular knitted (fabric material); the circular knitted is the material used for producing the seamless underwear t-shirt or tank top. The size of circular knitted is fixed by the width of chest size specification. Most suppliers do not have the machinery for producing all sizes of this product that the customer requires. The buyer company has to order this fabric from two or three sources. Some problems will occur such as quality, delivery and cost difference. The buyer may

look at the management of supplier to supplier relationship by asking them cooperative to supply complementary items. The supplier and supplier will cooperate to control quality, delivery and cost. However, it also depends on the situation.

6.2.2 Supplier Selection and Evaluation Method

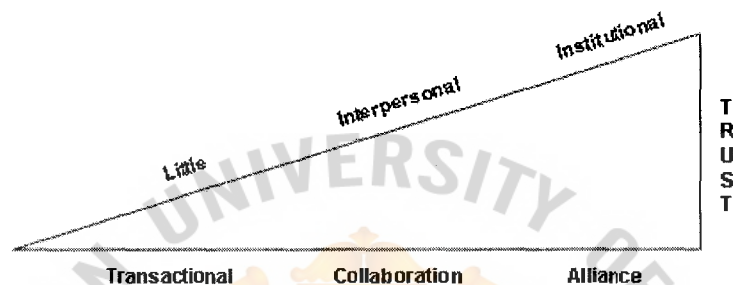
Since this case study applies supplier evaluation and selection in the fabric supplier category, the construction of Teng and Jaramillo (2005) can be applied to other groups of supplier. Teng and Jaramillo (2005) explained the advantage of this model; they state that their model has flexibility in adopting changes in business circumstances and the buyer can add or remove some factors to get an evaluation deeper into a suppliers' operations, or simply when the suppliers have a similar environment. Therefore, the criteria factors and questions in evaluation have to be adjusted to fit with the nature of product and type of suppliers. Moreover, the supplier evaluation and selection method can be extended into the computer software system use in the internal company. However, the disadvantage side of Teng and Jaramillo's methodology also discusses the weakness side of their method. AHP is the one methodology for developing their method. The weakness points of AHP have already been mentioned in the literature review: it is weak in determining interrelationships among factors, but the interrelationships among factors are inconsiderable in this model since it is for the sake of simplicity for using in the model. The reason of inconsiderable interrelationships among the factors is that the buyers and the cross functional teams in the downstream companies often use some subjective rating scheme to rate factors. But putting efforts into determining the correlations between factors is often not valuable in practice, as mentioned in chapter 2. Although the model can be easy to use by formulating the equation in Microsoft Excel, errors during keying the information, and mistake in the formula, can be incurred. Another weakness of this model is ranking reversal; the order of superiority of the decision may turn, if a new alternative is added to the hierarchy of the AHP model.

Regarding some factors in the evaluation model, it necessary to look at the historical record for using evaluation in order to give the score accurately. ABC Company has to re-construct the organization and management of the database in the system to

make it easier to find out, since some information is difficult to find and some is not recorded. Moreover, the result of evaluation and selection can then be accurate.

Furthermore, after the company selects the key suppliers, the company has to study the method or process of supplier relationship development. Burt et al., (2003) divides the supply relationship into three levels as the spectrum of supply relationships and institutional trust, as in Figure 5.7

Figure 5.7: Spectrum of Supply Relationships and Institutional Trust



Sources: World Class Supply Management: Burt, Dobler, Starling

The relationship, according to Figure 5.7, divides into three levels of supply relationship: Transactional, Collaborative and Alliance. This Figure also shows that trust relates with supply relationship. Moreover, trust is “the foundation of positive and productive buyer-supplier relations” (Handfield and Nichos, 2004, pp.29-35)

The first level is transactional level: it is the basic level in buying and selling products and services. For example: the buyer can switch to buy the goods or service from other suppliers if the product is out of shelf. The trust in this level is little, merely doing business only to exchange goods and money.

The second level is collaboration level: in this stage, the relationship between buyer and seller is closer than the first stage. Because of the competition pressure in the market, many business enterprises and organizations try to find the competitive advantage. They realize that to make the collaboration with the suppliers is a good weapon in business. They work as the partner in order to solve the problem, sharing communication, and both parties will enhance benefits for each other. Moreover, in enhancing the benefit, they are willing to share the risks incurred in business. The company will choose the key suppliers to be integrators and collaborators in business.

The third level is alliance level: this stage goes beyond collaboration. The trust is a mutual stage. They can be a party to access significant information such as planning, strategic and objective. Both parties will understand the business objective clearly in order to continue improvement and steer the business in the same direction. Both parties are willing to invest in the business together, such as development projects, launching new products and exchange of staffs. For instance, Company A is the buyer and B is the seller. They join to invest in a big project together in order to make a new product line. Both sides will express their ideas, set objectives, plan and develop strategies together. During the project, the staffs of Company B will work as the staff of Company A until the project is finished. Awareness of giving the idea to the competitor in this level is eliminated. Both of them have confidence in each other.

In Figure no. 6.1, the relationship between the company and suppliers are in the transactional level. The company wants to build a relationship with this group of suppliers selected for the next level of a supply relationship. The benefit of supplier relationships was discussed in the literature review. Moreover, Forker and Hershauer (2000) used step-wise regression analysis to investigate the relationship between supplier development practices and customer satisfaction, supplier satisfaction, and supplier quality performance. They concluded that control of quality management and supplier development programs were crucial factors that lead to mutual satisfaction among buyers and suppliers. Kannan and Tan (2007), Krause et al., (2000) found that direct supplier involvement activities, such as buyer site visits to supplier factories and training/education of supplier personnel, play a critical role in supplier performance improvement. More recently, Tracey and Tan (2001) found that the involvement of suppliers in the buyer's product development process and continuous improvement programs increases customer satisfaction and the overall firm performance. In summary, it appears from the literature that the implementation of supplier development practices should result in improved supplier performance and/or capabilities, which in turn would improve the buying firm's purchasing performance Kannan and Tan (2007). Successful relationships have also been shown to yield improvements in supply chain performance (Narasimhan and Nair, 2005; Benton and Maloni, 2005; Maloni and Benton, 2000). The above information is general information to help to spark the idea of developing supplier relationship programs.

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Appendix A: Questionnaire Instrument

'Case Study of Applying the Supplier Evaluation and Selection in Buyer Sourcing: Thailand Garment Company'

Dear Supervisors / Managers,

This questionnaire is a part of a case study currently being carried out by a Masters (M.sc. SCM) candidate in the faculty of Supply Chain Management (SCM) from the Graduate School of Management at Assumption University (AU). This case study attempts to seek the right supplier qualification for building the business relationship between the company and suppliers.

You are one of a number of supply chain members (Customer, Manufacturer, or Supplier) firms that have been selected to participate. Your participation will provide valuable information concerning: (1) General information about your firm, (2) The factors that are related for evaluation and selection the right qualification supplier. (3) The score to evaluate the suppliers.

In addition, please be assured that **all responses will be held strictly confidential and no information which could reveal your firm's or your own identity will be used in any data reporting, nor will it be shared in its individual form with any outside party without your expressed permission to do so.** The questionnaire takes some hours to complete.

Your participation and valuable contribution to this case study is greatly appreciated. Please answer all the questions fully and sent it back by hand when it's completed

Should you have any concerns or questions related to this questionnaire, please do not hesitate to contact Sasinan Tanawaritanan at 66867102111 or email: hata9_12@hotmail.com, M.sc.SCM Candidate, The Graduate School of Management, Assumption University.

Thank you for your valuable contribution to this case study.

Sincerely,

Sincerely,

Asst. Professor Dr. Mohammad Asif Salam

Sasinan Tanawaritanan

Program Director, SCM

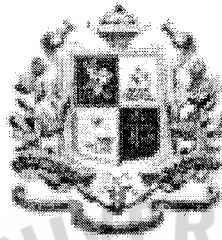
M.sc. SCM Candidate

School of Management, AU

School of Management, AU

Questionnaire

M.sc. SCM Case Study Paper (Graduate Project) on Applying the Supplier Evaluation and Selection in Buyer Sourcing: Thailand Garment Company'



**Supply Chain Management
Graduate School of Management
Assumption University, Thailand**



******Thank you for taking time to complete this questionnaire. We assure you of complete confidentiality on all of your responses.******

M.sc. SCM Case study Paper (Graduate Project)

Thank you for taking the time to participate in the study. This questionnaire should take about some hours to complete. *All responses are strictly confidential and no information which could reveal your firm's or your own identity will be used in any data reporting, nor will it be shared in its individual form with any outside party without your expressed permission to do so.*

PART I

GENERAL INSTRUCTIONS

This questionnaire paper is intended to capture the factors of both cluster and sub-factor which is the major and minor factor influence for measurement the performance of supplier. You will be asked to give the weight in each cluster and factor which is the major or minor factor influence for its using in part of calculation the total score of each supplier performance.

While weight given in each factor, please consider the list and give the weight. The way of given weight is assigned by yours need according to your policy and direction for evaluation the supplier's performance. Moreover, the score is also given in each factor for each supplier performance.

The questionnaire paper is divided into 2 sections. First section, you have to given the weight for cluster and factor influence in proposed decision matrix. The second section, you will give the score by history base and experience.

DEFINITION OF TERMS:

The definitions of the terms that will be used in this questionnaire are summarized below for your guidance and usefulness.

Supplier Evaluation – is the process of reducing a long list of potential suppliers to short list and finally to one or more suppliers (Hedderich *et al.*, 2006).

Supplier Selection – The objective of supplier selection is to identify suppliers with the highest potential for meeting a firm's needs consistently and at an acceptable cost. Selection is a broad comparison of suppliers using a common set of criteria and measures (Kahraman, *et al.*, 2003).

Flexibility – Flexibility is one of the important objectives in operation strategy model (Schroeder, 2000) and is often seen as a reaction to environmental uncertainty (Suarey *et al.*, 1991; Gerwin, 1993). In general, flexibility reflects an organization's ability to effectively adapt or respond to changes that add value in the customer's eyes (Upton, 1995).

Reliability - Reliability is associated with preventing or minimizing the likelihood of failure occurrences, reliability is a risk factor associated with profit making (Tiku *et al.*, 2004).

Continuous improvement:- Bessant *et al.* (1994) defined continuous improvement (CI) as a company-wide process of focused and continuous incremental innovation sustained over a long period of time.

SECTION 1

Please discuss about the weight of each cluster and factors before going to the next section. The total weight of all clusters will be equal to 1. For the total weight of all factors in one cluster will be equal to 1.

PROPOSED DECISION MATRIX FOR SUPPLIER SELECTION

CLUSTER	WEIGHT	FACTORS	WEIGHT
Delivery (C _D)	_____	Geographic location (K _{gl})	_____
		Freight terms (K _{ft})	_____
		Trade restrictions (K _{tr})	_____
		Total order lead time (K _{lt})	_____
Flexibility (C _D)	_____	Capacity (K _c)	_____
		Inventory availability (K _{iv})	_____
		Information sharing (K _{is})	_____
		Negotiability (K _n)	_____
		Customization (K _{cu})	_____
		Product Variety (K _{pv})	_____
Cost (C _C)	_____	Supplier's selling price (K _{sp})	_____
		Internal cost (K _{ic})	_____
		Ordering and invoicing (K _{oi})	_____
Quality (C _Q)	_____	Continuous improve. (K _{ip})	_____
		Customer service (K _{cs})	_____
		Certifications (K _{ct})	_____
		Percentage of on Time shipments (K _{ot})	_____
		Product quality (K _{pq})	_____

Reliability (C _R)	_____	Feeling of trust (K _t)	_____
		Country's political Situation (K _{ps})	_____
		Currency exchange Situation (K _{ce})	_____
		Warranty policies (K _{wp})	_____

SECTION 2

This section divides into two parts; part A is general information. Part B is the criteria factors for using evaluate the supplier. The answer in part A and B will be filled in the answer sheet.

Part A

- A. Name of Fabric supplier: _____
- B. Address of this supplier: _____
- C. What is the location of this fabric supplier? ☐ Oversea ☐ Local
- D. What kind of fabric does this supplier sell? ☐ Knitted fabric ☐ Woven fabric

Part B

These criteria factors use for evaluate the supplier in order to select to be key supplier. Please kindly read each question in each factor criteria with give the score by the circle in the score which provides in another sheet for each supplier.

The first cluster: Delivery

This cluster consists of geographic location, freight terms, trade restrictions and total order cycle time.

- 1.1 Geographic location (K_{gl}):** represent the location from logistics point of view. Please give the scales for supplier's logistic location of delivery or contact the goods or sample to the company.

There are 4 scales that determine by location for this supplier.

☐ Score = 4 very close proximity: Located in Bangkok & Proximities

☐ Score = 3 close proximity: Location in Thailand

☐ Score = 2 far : Located in Hong Kong, China, Taiwan, Korea

☐ Score = 1 very far : Located in other countries

- 1.2 Freight term (K_{ft}):** refer to the favorability of shipping conditions and associated with the supplier's level of responsibility over the shipping process. Does the supplier take responsibility over the shipping process or willing to do as the company request? There are 4 scales as below:

☐ Excellent (score=4) ☐ Good (score=3)

☐ Fair (score=2) ☐ Poor (score=1)

- 1.3 Trade restrictions (K_{tr}):** refer to government restriction for a certain type of products in both sides of supply chain. Tariff and custom duties will be considered.

☐ High trade restrictions (score=4)

☐ Moderate trade restriction (score=3)

☐ Low trade restriction (score=2)

☐ Free trade agreement (score=1)

1.4 Total order lead time (K_t): refer to the lead time from the moment a buyer placed an order to the time the customer's designated site received the ordered products. This factor will be determined in the rank of supplier performance.

1.4.1 If your supplier is the knitted fabric supplier, please select the below ranking. If it is woven fabric supplier, please select the ranking in point 1.4.2.

- ☐ Excellent with a total order lead time from 25-34 days (score=4)
- ☐ Good with a total order lead time from 35-44 days (score=3)
- ☐ Fair with a total order lead time from 45-54 days (score=2)
- ☐ Poor with a time beyond 54 days (score=1)

1.4.2 If this supplier is woven fabric supplier, please select the ranking as below.

- ☐ Excellent with a total order lead time from 30-39 days (score=4)
- ☐ Good with a total order lead time from 40-49 days (score=3)
- ☐ Fair with a total order lead time from 50-59 days (score=2)
- ☐ Poor with a time beyond 59 days (score=1)

The second cluster: Flexibility

The flexibility cluster will be assigned into capacity, inventory availability, and information sharing, negotiability, customization and product variety.

2.1 Capacity (K_c) : refer to this supplier have the flexibility to do various size of order. Does the supplier have the flexibility to do the quantity as the company request? There are four scales in the following.

- ☐ Very high (score=4)
- ☐ High (score=3)
- ☐ Acceptable (score=2)
- ☐ Low (score=1).

2.2 Inventory availability (K_{iv}) : The company will determine in term of flexible in booking quantity of raw fabric in the promise period and quantity. Does the supplier flexible in booking the quantity of raw fabric in the promise period and quantity? There are four scales in the following:

- ☐ Very high (score=4) ☐ High (score=3)
- ☐ Acceptable (score=2) ☐ Low (score=1).

2.3 Information sharing (K_{is}) : concern with information of new product launching in term of design, quality, functional, and price. Moreover, it consists of production status, and ordering status. Is the supplier willing to share the information as the above sample when we ask for? The scale will be assigned into four scales as below.

- ☐ Very high (score=4) ☐ High (score=3)
- ☐ Acceptable (score=2) ☐ Low (score=1).

2.4 Negotiability (K_n) : is associated with the mutual trust existed between supply chain partners and is higher in long term relationships. The suppliers are willing to accept the condition in the contract and condition in term of payment. Does the supplier have the flexibility of negotiation? This category is evaluated according to the scales as below.

____ Very high (score=4) ____ High (score=3)
____ Acceptable (score=2) ____ Low (score=1).

2.5 Customization (K_{cu}) : to evaluate the supplier's ability to take an order with special characteristic. Since the special requests may require special machine or technology setups, this category favor small and medium size organizations with less complex production processes. Does the supplier has ability to do the product as company request? There are four scales in the following.

____ Very high (score=4) ____ High (score=3)
____ Acceptable (score=2) ____ Low (score=1).

2.6 Product variety (K_{pv}) : to ability to produce or have the variety product design.

____ Very high (score=4) ____ High (score=3)
____ Acceptable (score=2) ____ Low (score=1).

The third cluster: Cost

The supplier's selling price, internal cost and the cost of ordering and invoicing are the evaluation factors in this cluster.

3.1 Supplier's selling price (K_{sp}) : Most of customers are searching for the less costly of products. They have to take into account of cost of procuring from certain sources; whether they require air, ground or maritime shipments, which ultimately affect the final price of product. Which level of price does the supplier sell the product? This factor will be evaluated as four scales:

____ High price (score=4) ____ Acceptable (score=3)
____ Low price (score=2) ____ Very low price (score=1)

3.2 Internal cost (K_{ip}) : In addition to the product price that a company has to pay for, other costs related with such as transportation, quality must also be considered (rectification, waste, defects and plant visits). The minimization of internal costs, the suppliers are capable to assume or absorb the entire cost. How much does the company have to pay the other costs that happen from the supplier? The factor will be given as four scales as the following.

____ High internal costs (score=4) ____ Acceptable internal cost (score=3)
____ Low internal costs (score=2) ____ Very low internal cost (score=1).

3.3 Ordering and invoicing (K_{oi}) : it relates to the ease of order placing in term of cooperate in doing the document same way of buyers or buyers' request. Moreover the accuracy of information in the document and language, it is also important because it will affect in time period to pay. Is the supplier willing or cooperate to do the ordering and invoicing document or policy as the company request? This factor will be evaluated as four ratings.

____ Excellent (score=4) ____ Good (score=3)
____ Fair (score=2) ____ Poor (score=1)

The fourth cluster: Quality

The quality cluster includes four factors that consist of continuous improvement, certifications, customer service, percentage of on time deliveries, and product quality.

4.1 Continuous improvement (K_{ip}): could be defined as the continuous enhancement in lead times, conformities and reliability of deliveries. It's also including with improvement of quality of product, communication and willing to improve in the point of customers' complain or request. How much does the supplier present the sings of improvement as above explanation? The scales are assigned as below.

____ Score = 4 High : the supplier constantly presents signs of improvements

____ Score = 3 Moderate : the supplier occasionally presents signs of improvements

____ Score = 2 Acceptable : the supplier rarely presents sings of improvements

____ Score = 1 Poor : the supplier never presents signs of improvements

4.2 Certificate factor (K_{cs}) : The certifications factor is for the recognition of the supplier's quality level. Buyers may use supplier certifications as quality assurance instrument that will determine whether or not some suppliers are capable to follow standards in the industry. Since the target market of company is Europe market, the Okotex, EU flower and Eco-tex are concerned and at least certificate of social conduct should be received. The buyers can give the score as below:

____ Score = 4 Very high : the supplier has Okotex certification, Social Code of Conduct and other supplier certifications.

____ Score = 3 High : the supplier has Okotex certification and Social Code of Conduct but no supplier certifications in others.

____ Score = 2 Acceptable : the supplier has Social Code of Conduct certifications.

____ Score = 1 Poor : the supplier does not have any certification.

4.3 Customer service (K_{cs}) : the interaction with suppliers has an important role in the smooth flow of goods and information. Moreover, customer service shows a supplier's effectiveness to respond to customer requests or complaints. Which level does the supplier have in term of customer service? The scales are design as below:

____ Score = 4 Excellent : the supplier always attended complaints or requests promptly.

____ Score = 3 Good : the supplier attended complaints or requests promptly most of the times.

____ Score = 2 Fair : the supplier attended complaints or requests promptly occasionally.

____ Score = 1 Poor : the supplier never attended complaints or requests promptly.

4.4 % on-time deliveries (K_{ot}) : it is one key factors in supplier quality since some obstacles may affect on-time deliveries, such as in-transit delays. Other difficulties in on time deliveries may be customs inefficiencies, quota limitations and inefficient paperwork processes. Which level does the supplier delivery the goods on time? This category is evaluated as follows.

____ Score = 4 Very high : more than 95% of shipments are delivered on time.

____ Score = 3 High : 90-95% of shipments are delivery on time.

____ Score = 2 Moderate : 85-90% of shipments are delivery on time.

____ Score = Low :less than 85 %of shipments are delivery on time.

4.5 Product quality (K_{pq}) : It showed the quality level of itself as the customers' standard and request. Although the certification factor can recognize of the supplier's quality level but the quality of product is importance. The quality of raw material also affects in the final product. Please give the score for the quality of goods that this supplier produces as below. The scales are assigned as the following score.

____ Score = 4 High

____ Score = 3 Moderate

____ Score = 2 Acceptable,

____ Score = 1 Poor.

The fifth cluster: Reliability

There is concern with feeling of trust, country's political situation, currency exchange situation and warranty.

5.1 Feeling of trust (K_t) : The feeling of trust is evaluated according to the buyer's perception of given supplier. The feeling of trust is determined by an on-going partnership between supply chain partners and performance evaluations of supplier over the years. How much do the supplier associates with this factor? The evaluation will be divided into four levels :

____ Very high (score=4)

____ High (score=3)

____ Moderate (score=2)

____ Low (score=1).

5.2 Country's political situation (K_{ps}) : lies in the buyer's concerns about potential disruptions in the flow of goods that mostly caused by external situations beyond the supplier's control. Therefore the evaluation for this factor includes four rating as blow.

____ Score = 4 Excellent : the supplier's country of origin exhibits good short and long term stability and there are no absolutely of distracting supply chain operations due to country's political situation.

____ Score = 3 Good : the supplier's country of origin exhibits good stability in the short and long term.

____ Score = 2 Fair : the supplier's country of origin exhibits some concerns regarding political stability. Some concerns about disruptive events may exist in the supply chain operations.

____ Score = 1 Poor : the supplier's country of origin exhibits serious concerns regarding political stability and disruptive events in supply chain activities.

5.3 Currency exchange situation (K_{ce}) : This factor is more concern with the oversea suppliers. The suppliers in the countries with aggressive devaluation policies find their product very competitive in international markets. On the other hand, companies in the countries with revaluated currencies find their products less competitive in international markets. The currency will also affect with the cost of product. It can relate with the currency rate or type that promise between suppliers and buyers. The buyer determines the degree of favorability in four scales :

____ Very favorable (score=4)

____ Favorable (score=3)

____ Neutral (score=2)

____ Non favorable (score=1).

5.4 Warranty (K_{wp}) : Warranties are associated with on time deliveries. Buyers may expect some rebates on late deliveries, penalties for late deliveries or charge back. It also includes with quality of product (defect and out of standard). Please kindly give the supplier score as below.

____ Score = 4 Very favorable: takes full responsibility on non-conformities and offers rebates on late shipments.

____ Score = 3 Favorable : takes partial responsibility on on-conformities or offer rebates when deliveries are not received on time.

____ Score = 2 Neutral : only takes partial responsibility on non-conformities.

____ Score = 1 Non Favorable : doesn't take any responsibility on non-conformities or late shipment.



Answer sheet:

This sheet is for giving the score for each supplier. Please read the question in section 2 for giving the score for each supplier. One answer sheet is for one supplier.

Answer for Part A:

A. Name of Fabric supplier: _____ NO. _____

B. Address of this supplier: _____

C. What is the location of this fabric supplier? ___ Oversea ___ Local

D. What kind of fabric does this supplier sell? ___ Knitted fabric ___ Woven fabric

Answer for Part B:

Cluster		Score			
1. Delivery	1.1 Geographic Location	1	2	3	4
	1.2 Freight Term	1	2	3	4
	1.3 Trade restriction	1	2	3	4
	1.4 Total order lead time for knitted fabric	1	2	3	4
2. Flexibility	2.1 Capacity	1	2	3	4
	2.2 Inventory availability	1	2	3	4
	2.3 Information sharing	1	2	3	4
	2.4 Negotiability	1	2	3	4
	2.5 Customization	1	2	3	4
	2.6 Product variety	1	2	3	4
3. Cost	3.1 Supplier's selling price	1	2	3	4
	3.2 Internal cost	1	2	3	4
	3.3 Ordering and invoicing	1	2	3	4
4. Quality	4.1 Continuous Improvement	1	2	3	4
	4.2 Certificate factor	1	2	3	4
	4.3 Customer service	1	2	3	4
	4.4 % on-time deliveries	1	2	3	4
	4.5 Product quality	1	2	3	4
5. Reliability	5.1 Feeling a trust	1	2	3	4
	5.2 Country's political situation	1	2	3	4
	5.3 Currency exchange situation	1	2	3	4
	5.4 Warranty	1	2	3	4