Factors affecting decision making of out sourcing

There are a lot of factors affecting the decision making of out-sourcing in textiles, but this research focused on some of the important and very relevant factors. It highlighted to develop an evaluation model to measure the Total Index Score of Supplier Performance in order to study the importance of factors affecting the decision making of out-sourcing & supplier performance in textiles. The major interest was one of the major strategic issues – the sourcing issue, which was how to select and evaluate suppliers in the sourcing process. The first objective of this study was chain operations to investigate current available supplier selection and evaluation models and determine their potentials in textile/apparel supply chain applications. The second objective was to determine the required variables in evaluating supplier performance for textile/apparel supply and to develop a supplier selection and evaluation model based on these selected variables. The overall objective of this study was to provide an easy to use evaluation matrix that can help textile/apparel companies in selecting the right supply partners to improve the whole supply chain's performance.

As there are a lot of factors affecting the decision making of out-sourcing in textiles, there was a need to study the importance of these factors on the basis of buyers' needs and demands. The buyers can get a grasp of textile apparels to sort-out the ways to find out the best of the best possible buyers and also the buyers to analyze and search-out the ways to remain competitive in the open market for respective buyers.

The limitations of this study were the factors affecting the decision making of out-sourcing in textiles (including Delivery, Flexibility, Cost, Quality & Reliability) are of very subjective nature. These factors are difficult to

quantify. These factors not only vary country to country, but they also vary buyer to buyer. It is assumed that the buyers are only USA based (Heshmati, 2003).

Literature Review

A Model for Evaluation and Selection of Suppliers in Global Textile and Apparel Supply Chains:

Introduction of the Model:

With the current competitive textile / apparel market, the textile/apparel companies are adjusting their business strategy by expanding their global out-sourcing activities to cut down their manufacturing costs. In the last two decades, some manufacturers in the USA have shifted their operations to foreign countries with more attractive tax policies and labor costs. Textile/apparel, semiconductor, and automotive industries are just some of the industries that enjoyed the benefits of cheaper costs in Mexico and Central America. Meanwhile, Asian countries are taking huge steps to improve their production and manufacturing processes to offer low cost products. In contrast, Asian countries have adopted an aggressive devaluation policy for their currency, thus boosting the demand of products from these countries. In recent rounds of negotiations, the United States agreed to eliminate the quota system that has protected the textile / apparel industry for decades. In addition, China's access to the World Trade Organization (WTO) brings a new set of perspectives to the textile/apparel industry, which is experiencing significant changes, fierce competition, and cost reduction to maintain or gain participation in specific markets. As the US textile/apparel industry is moving toward out-sourcing operations, effective

supply chain management (SCM) becomes more critical. Presently, US companies must decide when, where, and what to outsource, as an important issue in their strategic planning process. Therefore, the implementation of international sourcing strategy is playing a critical role in the changes of textile/apparel supply chain operations fundamentally. Manufacturers are influenced to implement international sourcing operations mainly due to their desire to establish a presence in a foreign market, their needs to satisfy offset requirements and to increase the number of available sources, and their reactions to local and foreign competitions. Strategic sourcing aims to reduce the risk of disrupting the supply chain flows and the total cost of the products. Big textile/apparel companies usually use a multiple sourcing strategy to reduce risk and to lower down cost, while at the same time, to establish close relationships between personnel on both the buyer and supplier sides. One important issue being raised in the operations of textile / apparel supply chain is the selection of suppliers and the evaluation of these suppliers. Companies needs to continuously improve their supply chain operations, and meanwhile, add new suppliers to the existing supply chain as part of improvement activities if necessary. Even with very competitive product prices, Wal-Mart is still relentlessly searching for the suppliers that can provide products with cheaper prices and better services. To select new partners and evaluate current partners becomes critical in the management and implementation of supply chain operations (May, 1998).

In this research, logistics issues involving supplier selection and evaluation are the center of the study given that the US textile/apparel industry is

currently facing the need to establish effective relationships with global suppliers. With the elevation of the current global sourcing trend, it is more difficult for textile/apparel companies to conduct frequent on-site supplier evaluations. So these companies need to develop an effective process for the selection and evaluation of suppliers as a part of their SCM processes. This study intends to provide a supplier selection and evaluation model to help textile/apparel companies in managing their supplier related supply chain activities.

The Development of the Supplier Evaluation Model:

The model is designed according to a hierarchical structure with several layers of decision-making activities. The first level of the hierarchy is for the most critical areas in global sourcing for textile/apparel supply chains. This level consists of five areas that are called " clusters", which signify grouping factors include; Delivery, Flexibility, Cost, Quality and Reliability. Each of these clusters has a weight, which is assigned by buyers according to their needs. A second level of the hierarchy consists of factors that have significant effect on each cluster. Again, buyers must assign appropriate weights to each factor according to specific situations or needs. Additionally, a desired value must be determined for each factor to provide a framework or benchmark. Following the practices in the textile/apparel industry, two main characteristics for this model has been taken. This first characteristic is to obtain a dimensionless index as the result of running the model. The grade that each supplier receives on each factor was divided by the desired value to obtain a dimensionless index that was then be multiplied by its corresponding factor and cluster weight. It integrated both qualitative and

quantitative factors in the evaluation process. For this reason the model could also be classified as a multi-attribute approach. The second characteristic, not considering correlations between factors in the model, is for the sake of simplicity in the use of the model. Since the buyers and the cross functional teams in the downstream companies often use some subjective rating scheme to rate factors, putting efforts in determining the correlations between factors is often not valuable in practice.

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 was important to note that high cost score has a negative impact on the total supplier score. Given that cost effectiveness was an important motivation for global sourcing, the cost score was an important evaluation and influence over the total supplier score (Maltz and Ellram, 1999). The following equation shows the supplier evaluation model:

Total Supplier Score = Delivery Score +â€⊞ Flexibility Score +â€⊞ Quality Score + â€⊞ Reliability score – Cost Score (equation. 1)

The five scores that determine the total supplier score are from the five key supplier performance clusters. To determine these cluster scores, one required to determine the cluster weights (C), the factor weights (K) that influence the cluster, the desired value (DV), and a V value that is computed by dividing a buyer provided score by the factor's DV value.

The Clusters for Determining Supplier Performance:

As shown in equation (1), there are five clusters under the supplier performance level. Three to five factors are under these five clusters. Figure-1 shows the structure of the decision-making matrix in the proposed approach for evaluating supplier performance and selecting textile/apparel suppliers. The factors affecting the five main clusters' performance were selected based on the most common and significant issues in textile/apparel supply chains. The use of the structure in figure-1 re-emphasized one important aspect, supplier's selling price should not be the sole factor used in selecting suppliers. Even in the cost cluster, the cost effect is according to internal cost and the cost associated with ordering and invoicing process, in addition to the selling price obtained. Textile/apparel companies have to evaluate all cost items encountered in each purchasing process along with the product cost and the consideration of all the other clusters before extending orders to the suppliers.

Figure-1 (Supplier Performance Evaluation Matrix Structure)

Geographic Location

Freight Terms

Total Order Lead Time

Trade Restrictions

Capacity

Inventory Availability

Information Sharing

Negotiability

Customization

Supplier's Selling Price

Internal Cost

Ordering and Invoicing

Continuous Improve. Programs

Customer Service

Certifications

% of On-Time Shipments

Felling of Trust

Country's Political Situation

Currency Exchange Situation

Warranty Policies

Delivery

Flexibility

Cost

Quality

Reliability

Textile / Apparel

Supplier

Performance

Low product price is critical to the selection of suppliers. But all the other incurred costs in

the purchasing process and supply chain operations are equally important. The proposed matrix provides a realistic and easy to use structure for textile/apparel companies to evaluate suppliers.

The First Cluster (DELIVERY):

Delivery cluster consisted of four factors: Geographic location (Kgl), Freight terms (Kft), Total order cycle time(Klt) and Trade restrictions(Ktr).

Geographic location (Kgl): Geographic location (Kgl) represented the vicinity to customer and was determinant to supplier selection from the logistics point of view. A good example of preferable supplier locations for the US textile/apparel supply chain include locations in Mexico, Central America, and other Caribbean countries, which enjoyed a boom in the 1980s and 1990s due to their close proximity to US companies. In contrast, suppliers located in the Far East may score poorly on this category. There are four scores assigned to the geographic location factor that include:

Very close proximity with suppliers located in Mexico, Central America, and Caribbean countries Ù‹(score = 4)

Close proximity with suppliers located in Andean countries and Brazil Ù‹(score = 3)

Far with suppliers located in Europe, Africa, Middle East, and some other South American countries Ù‹(score = 2) and

Very Far with suppliers located in the Far East and the Pacific Rim Ù‹(score = 1)

Freight Terms (Kft): The next factor under the delivery cluster was the factor of freight terms (Kft). This factor referred to the favor ability of shipping conditions from the supplier chain's point of view. This favor ability was associated with the supplier's level of responsibility over the shipping process. Scores on this factor are according to the following four scales:

Excellent Ù‹(score = 4)

Good Ù‹(score = 3)

Fair Ù‹(score = 2) and

Poor Ù‹(score = 1)

Total Order Lead Time (Klt): The last factor influencing delivery performance was the total order lead-time (Klt). The total order lead-time is the lead-time from the moment a buyer placed an order to the time the customer's designated site received the ordered products. Inefficiencies in production,

transportation and flow of information between involved supply chain parties may have negative effect on this factor. Since it was very difficult to establish specific targets for this factor, a buyer determined the ranges for performance evaluation. For example, a buyer ranked the supplier differently as:

Excellent with a total order lead time from 15 to 20 days(score = 4)

Good with a period from 21 to 25 days Ù‹) score = 3)

Fair with a period from 26 to 30 days Ù‹(score = 2) and

Poor with a time beyond 30 days (score = 1(

Trade Restrictions (Ktr): The third factor of the delivery cluster was the trade restrictions (Ktr) factor. It takes into account government regulations for a certain type of products in both sides of the supply chain. Tariffs and custom duties were the parameters usually considered in this category. It was important to note that a high score on this factor had a negative influence on the delivery index. Scores on this category are according to the level of trade restrictions that include:

High trade restrictions Ù‹(score = 4(

Moderate trade restrictions Ù‹(score = 3(

Low trade restrictions Ù‹)score = 2) and

Free-trade agreements between countries (score = 1)

The adoptions of just-in-time practices were forcing suppliers to narrow down these ranges. The delivery score calculated in equation (2) is according to all factors in the delivery cluster:

Delivery Score = CD [(Kgl*Vgl) + (Kft*Vft) + (Klt*Vlt) – (Ktr*Vtr)]

In the equation, CD is the weight of the delivery cluster and Vgl, Vft, Vtr, and Vlt represent the values obtained for each factor after dividing the factor's score by its desired value (DV).

The Second Cluster (FLEXIBILITY):

The flexibility cluster was evaluated in terms of a supplier's capacity to respond to unexpected customer demands. Supply chain flexibility relates to activities within an organization's departments as well as among external partners including: Suppliers, Carriers, Third-party companies and Information system providers. Research papers had identified six components of flexibility, which were: Production flexibility, Market flexibility, Logistics flexibility, Supply flexibility, Organizational flexibility and Information systems flexibility. Here, the approach in evaluating supplier's flexibility was according to five factors including: Capacity (Kc), Inventory Availability (Kiv), Information Sharing (Kis), Negotiability (Kn), Customization (Kcu).

Capacity (Kc): Capacity (Kc) was determined by the buyer's knowledge or information obtained from the source itself. This score must display the levels of economic order quantities that a supplier can deal with. Scores on this factor are according to the following four scales:

Very High Ù‹(score = 4)

High Ù‹(score = 3)

Acceptable Ù‹(score = 2(and

Low Ù‹)score = 1)

Inventory Availability (Kiv): The second factor was the inventory availability (Kiv) factor. Normally buyers prefer to get suppliers to keep certain levels of safety stocks. This factor was measured in terms of weeks of safety stocks or available to promise quantities. Small and medium size companies with make-to-order production systems are likely to score poorly on this category. Scales on this category were the same as the scales for the previous factor.

Very High Ù‹(score = 4)

High Ù‹(score = 3)

Acceptable Ù‹(score = 2(and

Low (score = 1)

Information Sharing (Kis): The third factor, information sharing (Kis), refers to the level of information shared between parties. For example, buyers may want to receive constant updates of inventory levels, production plans, and status of orders. On the other hand, suppliers may want to have access to the buyer's forecasting data in order to prepare for potential purchasing orders. Under the current circumstances, real time information availability as well as compatibility of information systems between parties depicted the

difference between high and low levels of information sharing. Still, most buyers evaluated suppliers' information sharing performance based on best knowledge of these suppliers' systems. The scales used to evaluate information sharing between parties included:

Very High with real time updates and compatible electronic data interchange (EDI) technologies Ù‹(score = 4)

High with weekly (or less) updates and compatible EDI technologies (score = 3)

Acceptable with updates obtained between one to two weeks and with low compatibility in EDI technologies (score = 2) and

Low with updates obtained on a monthly basis and with no compatibility or inexistent EDI ability (score = 1)

Negotiability (Kn): Negotiability (Kn) was the fourth flexibility factor. Even though many companies preferred to manage contracts with suppliers through brokers, the conditions of such contracts constituted an important issue for the supplier evaluation process. Negotiability was associated with the mutual trust existed between supply chain partners and was higher in long-term relationships. This category was evaluated according to the scales of:

Very High (score = 4);

High Ù‹(score = 3);

Acceptable Ù‹) score = 2); and

Low Ù‹(score = 1).

Customization (Kcu): The last factor for the flexibility cluster was the customization (Kcu) factor. This factor intended to evaluate the supplier's ability to take orders with special characteristics. Since unusual requests may require special machine set-ups, this category favors small and medium size organizations with less complex production processes. Furthermore, suppliers with a make-to-order production system was more likely to obtain a good evaluation on this category. Scales on this category were the same as those of the negotiation factor.

Very High (score = 4);

High Ù‹(score = 3);

Acceptable Ù‹) score = 2); and

Low Ù‹(score = 1).

The flexibility score was computed in equation (3) with CF as the weight of the flexibility cluster:

Flexibility Score = CF [(Kc*Vc) + (Kiv*Viv) + (Kis*Vis) + (Kn*Vn) + (Kcu*Vcu)]

The Third Cluster (COST): Cost cluster often represented the main reason why the US textile/apparel manufacturers have been hurt by foreign competition. The global suppliers' extremely competitive low product prices and increasing levels of quality had led textile/apparel companies to think that it was significantly cost-effective to partially or totally manufacture

textile/apparel goods overseas. Without any doubt, cost cluster has great influence on the supplier selection process. The three factors considered in the evaluation of the cost cluster were Supplier's selling price (Ksp), Internal cost (Kic), and Cost for ordering and invoicing (Koi).

Supplier's Selling Price (Ksp): Buyers are constantly searching for less costly products. They took into account the cost of procuring from certain sources; whether they require air, ground or maritime shipments, which ultimately affect the final price of the product. Supplier's selling price was evaluated according to the following four scales:

High Prices Ù‹(score = 4)

Acceptable Prices Ù‹(score = 3)

Low Prices Ù‹(score = 2) and

Very Low Prices (score = 1)

Internal Cost (Kic): The internal cost factor evaluates the total cost of each purchase and is adopted from the cost ratio method. In addition to the product price that a company had to pay for, other costs related with transportation and quality must also be considered e. g rectification, waste, defects and plant visits. The minimization of internal costs was reflected in today's preference for suppliers that were capable to assume the entire manufacturing processes (the whole package). This category was evaluated according to the following scales:

High Internal Costs Ù‹(score = 4)

Acceptable Internal Costs (score = 3)

Low Internal Costs (score = 2) and

Very Low Internal Costs (score = 1)

Cost for Ordering and Invoicing (Koi): The third cost factor, the ordering and invoicing factor, relates to the ease of order placing. The implementation of EDI technologies had contributed to the advancements in the area of ordering. Big companies demanded their suppliers to implement online systems in which orders may be placed with less human interactions, thus dropping certain barriers such as different languages and time zones in the supply chain. In the same way, invoicing was a concern when the supplier and the buyer are located in different countries. Even though advances in technology have overcome many obstacles in international business activities, organizations still need to work on implementing customer-driven invoicing system in terms of simplicity and time period to pay. This factor has four ratings:

Excellent (score = 4)

Good Ù‹(score = 3(

Fair Ù‹(score = 2) and

Poor Ù‹(score = 1)

The cost score was calculated in equation (4) with CC being the weight of the cost cluster:

Cost Score = CC [(Ksp*Vsp) + (Kip*Vip) – (Koi*Voi)]

The Fourth Cluster (QUALITY): The quality cluster included four (4) factors:

Continuous Improvement (Kip), Certifications (Kct), Customer Service (Kcs) and Percentage of On-Time Deliveries (Kot).

Continuous Improvement (Kip): Continuous improvement could be defined as the incessant enhancement in lead times, conformities and reliability of deliveries. Supply chain members must continuously improve its logistical planning and scheduling. These activities consisted of selection of carriers and consolidation strategies for shipments. Continuous improvement in production planning and scheduling refers to the reduction of changes in production schedules or impact minimization when these changes are necessary. Improvement on communication also played an important role in the evaluation of this category. Buyers must assess suppliers' efforts to improve their EDI technologies for a better and quicker communication. Also, efforts to Cultural elimination and language barriers were considered as communication improvements. Finally, price reductions and special offers were also a part of suppliers' efforts to enhance customer satisfaction. Continuous improvement score was according to the following scale:

High: the supplier constantly presents signs of improvements Ù‹(score = 4)

Moderate: the supplier occasionally presents signs of improvements Ù‹(score = 3)

Acceptable: the supplier rarely presents signs of improvements Ù‹)score = 2) and

Poor: the supplier never presents signs of improvements Ù‹(score = 1)

Certifications (Kct): The certifications factor was for the recognition of the supplier's quality level. ISO-9000 certifications or other certifications from recognized organizations or customers have their significance in the evaluation process. Buyers may use supplier certifications as quality assurance instruments that determined whether or not some suppliers were capable to follow standards in the industry. This category was evaluated as:

Very high: the supplier has ISO 9000 certification

and other supplier certifications in the US (score = 4)

High: the supplier has ISO 9000 certification but no supplier certifications in the US (score = 3(

Acceptable: the supplier has supplier certifications in the US Ù‹(score = 2) and

Poor: the supplier does not have any certification (score = 1)

Customer Service (Kcs): The third factor was customer service. In the case of the US textile-apparel supply chain, in which large quantities of products are procured overseas, the interactions with suppliers has an important role in the smooth flow of goods and information. From a SCM perspective, customer service showed a supplier's effectiveness to respond to customer requests or complaints. Following this definition, this category may be evaluated as:

Excellent: the supplier always attended complaints or requests promptly Ù‹(score = 4)

Good: the supplier attended complaints or requests promptly most of the times Ù‹(score = 3(

Fair: the suppliers attended complaints or requests promptly occasionally Ù‹(score = 2)

Poor: the supplier never attended complaints or requests promptly Ù‹)score = 1)

Percentage of On-Time Deliveries (Kot): The last factor, percentage of on-time deliveries (Kot), was one of the 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 was evaluated as:

Very high: more than 95 percent of shipments are delivered on time Ù‹(score = 4)

High: 90 to 95 percent of shipments are delivered on time Ù‹score = 3)

Moderate: 85 to 90 percent of shipments are delivered on time Ù‹(score = 2) and

Low: less than 85 percent of shipments are delivered on time Ù‹(score = 1(

With these four factors, the quality score was calculated in equation (5) and the coefficient CQ was the weight of the quality cluster:

Quality Score = CQ [(Kip*Vip) + (Kcs*Vcs) + (Kct*Vct) + (Kot*Vot)]

The Fifth Cluster (RELIABILITY): The last cluster for supplier performance evaluation was the reliability of a supplier's operations to fulfill supply chain activities. Following four (4) factors influence the reliability of a supplier: The feeling of trust (Kt), the country's political situation (Kps), the currency exchange situation (Kce) and the warranty (Kwp).

The Feeling of Trust (Kt): The feeling of trust was evaluated according to the buyer's perception of a given supplier. Before approving a supplier's status, a textile/apparel company often checks-out the potential supplier's ability through procedures such as in-plant visits or sample testing to see if this supplier can follow the company's standards. Normally, buyers grant small orders to new suppliers as a " test" before placing larger quantity orders. The feeling of trust was determined by an on-going partnership between supply chain partners and performance evaluations of a supplier over the years. A supplier's reputation in the industry can influence the evaluation result in this category. The evaluation of this factor has the following four simple levels:

Very High (score = 4)

High Ù‹(score = 3(

Moderate Ù‹)score = 2(and

Low Ù‹)score = 1)

The Country's Political Situation (Kps): The importance of the second factor, country's political situation, 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. Suppliers from some South and Central American countries, as well as from less developed countries in South Asia, may score poorly in this category. The proposed evaluation criteria for this factor include four ratings:

Excellent (score = 4(

Good Ù‹(score = 3)

Fair Ù‹(score = 2(and

Poor Ù‹)score = 1)

The Excellent rating showed that the supplier's country of origin exhibited good short and long-term stability and there were absolutely no concerns of distracting supply chain operations due to the country's political situation. The Good rating provided that the supplier's country of origin demonstrated good stability in the short and long term. The Fair rating reveals that the supplier's country of origin exhibited some concerns regarding political stability. Some concerns about disruptive events may exist in the supply chain operations. The Poor rating showed that the supplier's country of origin exhibits serious concerns regarding political stability and disruptive events in supply chain activities.

The Currency Exchange Situation (Kce): The third factor for the reliability cluster, the currency exchange situation, had a big impact in the way the international textile/apparel supply chains have operated in the last few years. 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 found products less competitive in international markets. For example, Mexican products have lost market share in the last few years due to currency revaluation. Buyers may have preference for suppliers located in the countries where the currency exchange situation favors their companies in different planning horizons. The evaluation of this category was from a US buyer's perspective. The buyer determined the degree of favor- ability according to the following four scales:

Very Favorable (score = 4(

Favorable Ù‹(score = 3(

Neutral Ù‹(score = 2) and

Non Favorable Ù‹(score = 1)

The Warranty Policies (Kwp): Quite often the customer's requested concerned suppliers to provide warranty, the last factor in the reliability cluster. From a logistics point of view, warranties were associated with on-time deliveries. Buyers may expect some rebates on late deliveries, or called the other way, penalties for late deliveries or charge-back. The evaluation of this category was similar to the previous factor.

Very Favorable rating means that the supplier takes full responsibility on non-conformities and offers rebates on late shipments (score = 4)

The supplier takes partial responsibility on non-conformities or offers rebates when deliveries are not received on time if it has a Favorable rating (score = 3)

If the supplier only takes partial responsibility on non-conformities, it gets a Neutral rating (score = 2)

For the Non Favorable rating, the supplier does not take any responsibility on non-conformities (score = 1)

Equation (6) showed the computation for the reliability score. In the equation, CR was the weight of the reliability cluster.

Reliability Score = CR [(Kt*Vt) + (Kfe*Vfe) + (Ktr*Vtr) + (Kwp*Vwp)] (Equation- 6)

The Supplier Performance Evaluation Matrix: Table-1 showed the supplier performance evaluation matrix used in the evaluation and selection of suppliers based on the five clusters discussed above. This table was designed in the way that buyers can easily use this table to evaluate the suppliers while considering the major factors involved in the supply chain operations and not just the suppliers' product prices (Amiti and Wei, 2005)

Table-1 (Supplier Performance Evaluation Matrix)

Cluster

Weight

Factors Weight

DV

Supplier

A

Supplier

B

Supplier

C

Delivery

CD

Geographic location

Freight terms

Tr