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Challenges in Building a Global Supply Chain in the Apparel Industry

Introduction

In recent years, there have been many books (Chopra and Meindl, 2001; Handfield & Nichols, Jr., 1999; Simchi-Levi, D. Kaminsky and Simchi-Levi, E. 2000) and articles (Arntzen, Brown, Harrison, and Trafton, 1995; Cohen and Lee, 1989; Kopczak, 1997; and Lee and Billington, 1995) written on supply chains in various sectors of the economy, particularly in light of the globalization of markets. The supply chain is the sequence of suppliers and organizational buyers that spans all stages of processing from raw materials to final consumers (Melnyk and Denzler, 1996). Each step in the supply chain is a vital link for ensuring a quality product, in a timely manner, at the lowest possible cost to the final consumer. Contrary to the popularly held notion, managing suppliers is not the same as supply chain management. While the former (managing suppliers) has historically been the responsibility of purchasing functions in a

Abstract

The last decade of the twentieth century has been characterized with the growth of global supply chains in a wide variety of industries. Global supply chain management in the apparel industry presents a wide variety of challenges. This paper presents a framework elaborating the challenges associated with communication, cultural relationships, technology, production processes, supplier arrangements, and transportation infrastructure in building a *global supply chain in the apparel industry* catering primarily to the U.S. market. The paper, in the concluding section, makes a few suggestions for future research in global supply chain management in the apparel industry.

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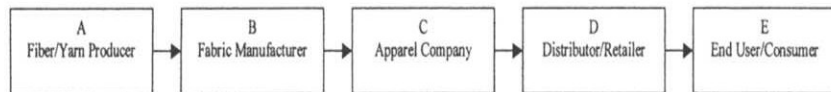
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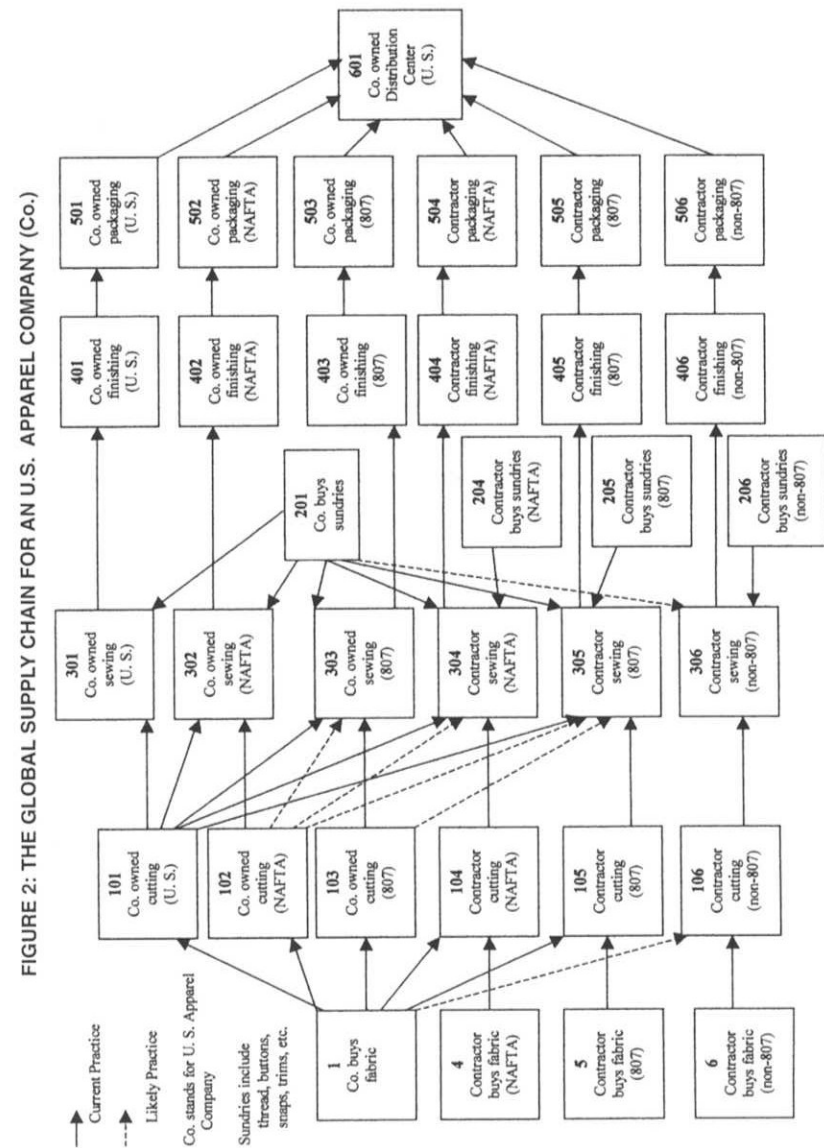
localized manner in organizations, the latter (supply chain management) takes on a more global and corporate perspective.

The concept of a global supply chain is not a new phenomenon. The petroleum industry has built global supply chains for more than a hundred years. Global petroleum companies such as Exxon and Royal Dutch/Shell drill for crude oil in Saudi Arabia, refine it in another country, and sell the petroleum products in a completely different part of the world. Taking a cue from the oil companies, automobile, computer, and apparel manufacturing industries have been building global supply chains during the last quarter of the twentieth century. Petroleum, automobile production, and computer manufacturing are characterized by a high degree of automation. The apparel industry, on the other hand, is not only labor intensive, but also has a wide variety of stock keeping units. The North American Free Trade Agreement (NAFTA), U. S. Tariff Item number 807 (popularly called 807), and the Caribbean Basin Initiative (CBI) add to the complexity of the apparel supply chain. The conventional criteria of cost, quality, delivery speed, delivery reliability, and flexibility of any business apply to apparel manufacturers as well. The garments manufactured according to the design specifications have to be made available at the right in the market place at the lowest cost.

FIGURE 1: TEXTILE AND APPAREL SUPPLY CHAIN



Traditionally, the textile and apparel industry’s supply chain includes the fiber producer, fabric (textile) manufacturer, apparel companies, distributor/retailer, and the end-user/consumer (Figure1). The apparel company undertakes a wide variety of operations to have the garments made available to the distributor/retailer. There are several different mechanisms to “package a garment”, i.e., procure the fabric, trims, and packing material, cut the fabric, sew the garment, and package the finished product (Figure 2).



There have been quite a few books written on supply chain management (Handfield and Nichols Jr., 1999; & Taylor, 1997) and Quick Response (Q/R) in the apparel industry (Apte, Lane, Sample, & Vaughn, 1993; Blackburn, 1991; Fisher, Obermeyer, Hammond, & Raman, 1994; Hammond, 1993; Hammond & Kelly, 1991; Iyer and Bergen, 1997; & Skinner, 1992), in particular. Cohen and Lee (1989) & Arntzen, Brown, Harrison, & Trafton (1995) have elaborated on global supply chains in the computer industry. In the recent past, studies have attempted to focus on international manufacturing strategies (Bolisani and Scarso, 1996) and buyer-subcontractor relationships (Da Villa and Panizzola, 1996) in the clothing industry. While the two studies do throw some light on the subject, they are, however, merely descriptive and do not include very much of quantitative modeling and/or analysis. Research by Nuttle, King, and Hunter, (1991), Hunter, King, and Nuttle (1992), and Hunter, King, and Nuttle (1996) has dealt with Quick Response systems between the apparel companies and distributors/retailers (as seen in Figure 2). Hunter, King, Nuttle, and Wilson (1993) described a preliminary model for an apparel supply chain. Complexities of the global supply chain were not incorporated in that model. Also, global supply chains internal to apparel manufacturing firms have not been systematically studied in great detail. This paper attempts to make a beginning in filling that void.

Apparel manufacturers (catering primarily to the U.S. market) face a complex problem (with a wide-ranging set of decisions to be made) in managing their internal global supply chain. The decisions include:

- How much of the finished product is to be made at in-house manufacturing plants?
- How much of the finished product is to be bought from external subcontractors?
- How much of the raw material (fabric, buttons, etc.) is to be bought from each of the raw material suppliers?
- Which raw material supplier would supply (and in what quantities) to which of the subcontractors and in-house plants?

All the decisions have to work towards minimizing total system-wide costs, which comprise of tangible costs (in the form of labor costs, overhead costs, transportation costs, raw material costs, duties, taxes, and inventory carrying costs) and intangible costs (inability to reliably supply quality products with short lead times). The total system-wide cost varies depending on which supplier is selected to supply to which Subcontractor/plant. These costs could be better understood in light of the challenges faced by apparel companies in managing their operations in different parts of the world. This article makes an attempt in presenting those challenges based on a small survey of 6 executives in a global sourcing organization of a U.S. based apparel company. The six executives included two of the authors of this paper and four merchandising managers in the global sourcing organization of a U.S. apparel company. The merchandising managers have product-wise responsibilities for knit shirts, woven materials bottoms, and specialty items. Dornier, Ernst, Fender, and Kouvelis (1998) pointed out there are greater degrees of complexity and uncertainty in managing the global supply chain than a domestic supply chain. Some of those complexities and uncertainties, they argued, result from:

- substantial geographical distances,
- added forecasting difficulties and inaccuracies,
- exchange rate and other macro-economic uncertainties,
- infra-structural inadequacies (in terms of worker skill, supplier availability and supplier quality, lack of local process equipment and technologies, and inadequacies in transportation and telecommunications), and
- explosive dimensions of product variety.

Added to these complexities, Skinner (1964) enumerated on the differences in cultural factors (such as assumptions, personal beliefs and aspirations, interpersonal relationships, and social structure) that complicate global logistics. Dornier, Ernst, Fender, and Kouvelis (1998) and Skinner (1964) presented the issues as applicable to industries

in general. In this paper, the challenges identified by the earlier researchers will be specifically presented in a form applicable to the apparel industry.

This article would be useful to practitioners and researchers interested in understanding some of the challenges in building global supply chains in the apparel industry. The next section of the paper discusses those challenges in greater depth. The last section of the paper concludes with some suggestion for future research.

Challenges in Building a Global Supply Chain

Parts of the world such as: Southeast Asia, the Indian Subcontinent, Latin America, former Soviet Union Republics, and Africa present different types of challenges in building a global supply chain in the apparel industry. The challenges have been described based on a survey (consisting of open-ended questions) of six executives in a global sourcing organization of an U.S. apparel-manufacturing firm. The respondents include two senior officers and four merchandising managers in the global sourcing organization of a U.S. apparel company.

The merchandising managers have product-wise responsibilities for knit shirts, woven materials, bottoms, and specialty items. The respondents have on an average more than 15 years of experience in global sourcing operations. Each of the respondents were asked to describe the challenges in terms of communication, cultural relationships, technology, production processes, supplier arrangements, and transportation infrastructure faced by them in sourcing from the five regions, namely, Southeast Asia, Indian Subcontinent (India, Pakistan, Bangladesh, and Sri Lanka), Latin America, former Soviet Union Republics, and Africa. The results were collated and have been presented in a descriptive form. The purpose of this research was neither to be predictive nor evaluative. Hence this single company case methodology using a small sample of managers in one company would be appropriate (Yin, 1994). The challenges faced by the managers in the U.S. apparel company are enumerated as follows.

I. Communication

The communication is complicated by the technology available to support spoken and written language, the spoken and written languages used, and terminology used to define the requirements. Most developing countries have telephones and computer stations but the clarity of the lines may be less than capable of supporting clear data transmissions. The telephones work for verbal communication but the time difference from one country to another may make this type of communication inconvenient at best. Spoken communication often leads to misunderstanding of what is said and sometime difficulty in reconstructing the conversation. Communication through electronic mail has become the mechanism of preference. The primary advantage in using this approach is that a written record of the communication that has taken place is available for future use. Electronic mail also allows the sender the time to thoughtfully construct the communication and the reader to read it clearly.

Southeast Asia

This area has been supplying the U.S. market for many years and has developed cultural norms of prompt and reasonably accurate information flow, regardless of the news, good or bad. Hong Kong Chinese have been primary movers in developing the region and generally there are Chinese management and supervision in the field, regardless of the country. This reduces the written language problems and English is the popular language of communication with the representatives of the U.S. apparel company. The plant level supervisors are able to speak English in addition to the local language. The flow of "paperwork" is well established and causes few problems. Barring communications to and from Hong Kong, e-mail and telephone communications in the rest of the region are poor. Despite the lack of major "language problems", difficulties do arise due to inadequate communication infrastructure.

Indian Subcontinent

English is the language of conducting business at the managerial level and it is the language generally used at the supervisory level as well making spoken communications more effective. Since the specifications (on both sides) are drawn up in English there is very little need to translate the requirements into another language. Information flow is good and generally timely. There is some tendency to delay bad news or present the information in a manner that softens the bad news. This might sometimes affect delivery lead times. Telephone communications are usually at an “acceptable to poor” range. E-mail communication is very good, dependable and accessible for the traveler with a laptop.

Latin America

This region is the most convenient from a communication perspective. The time zones are reasonably compatible with the U.S. offering work hour voice communication between customers and suppliers. While there are three languages (English, Spanish, and Portuguese) used in the region, local managers do make attempts to communicate in English with the representatives of the U. S. apparel companies. Spanish speaking capability is found among managers and employees of many U.S. companies as well. In many cases, U.S. apparel companies are producing specifications in Spanish as well as English giving clarity to the requirements from the very beginning of a “garment packaging” program. General production control information is slow and not dependable in content. Bad news may not be communicated at all by the local managers. Basic communication requirements such as transmitting the status of shipments are not carried out. This causes a lot of “surprise” delays. Land-line (non-cellular) telephone communications are continuing to improve but typically require several months to get connected when opening an office in a Latin American country. Cell phone communication is available everywhere and U.S. carriers even extend into Mexico as a local call in some areas. E-mail is used and available to laptop carriers throughout the region.

Former Soviet Union Republics

Generally, the region is still developing dependable land-line and data transmission communication capability. In some areas, governmental and organizational bureaucracy delays progress. Lap top e-mail capabilities are not readily available. Due to a wide range of languages, verbal and written communications tend to be difficult. Detailed requirements, even on commonly accepted norms in other parts of the world, have to be elaborated *a priori* in developing the supply chain for a “garment package” with partners in the republics of the former Soviet Union. This increases the delivery time to meet the market in the U.S.

Africa

Many languages are spoken; however, English is the primary language for conducting business and also used in daily activities in many areas of Africa. Depending on the country, it may be necessary to develop detailed requirements and follow up. Telephone communication, though developing, may not be dependable. In some remote locations, it is not available. Laptop connection for e-mail communication is marginal at best.

2. Cultural Relationships

Every country has its own unique culture and way of doing business. The country may have requirements that prevent or impede business from being done by some companies. Cultural relationships among the groups within a country may affect the stability of the country and create an atmosphere that business is not comfortable with. These cultural relationships interact throughout the supply chain.

Southeast Asia

Cultural etiquette plays an important role in business relationships throughout the region. It is necessary to review and learn the

etiquette required when working in the region. There are many different, and sometimes opposing, religions that shape the fabric of society, creating some production requirements that are unusual to the U.S. businessman. Holidays are many and are not always the same as are celebrated in the U.S. creating potential communication, delivery, and governmental problems. Since there are a large number of different countries, religions, and cultures in the region, commerce among the countries is affected and in some cases difficult, if not impossible.

Indian Subcontinent

This region is influenced greatly by religion and nationalism. This creates an atmosphere uncomfortable to some people and restricts full use of the region's potential in some cases. Bureaucracy is deeply imbedded in the culture and adds to the time and complexity of dealing with governmental issues. Also, there is difficulty in removing incompetent personnel creating a lack of motivation for management to act.

Latin America

The area has been a closed economy for most of the twentieth century, excepting Costa Rica and Chile. This has established cultural norms related to quality, cost, customer service, and delivery that are not compatible with current market requirements. While these are changing and efficiency, customer service, quality, and delivery are being addressed, more progress needs to be made. As in Asia, business etiquette may drive a deal as much as the deal itself. Relationships are important to doing business in the region. From the perspective of an apparel company in the U.S., the lack of timeliness may be the greatest concern regarding the business style in Latin America.

Former Soviet Union Republics

This area has many different ethnic and religious groups, some controlling a specific area, all influencing the business environment. A sense of urgency (on the part of organizational managers and

employees in the republics of the former Soviet) cannot be taken for granted by U. S. apparel firms.

Africa

Wide ranges of cultural and tribal influence form much of the business climate. Traditional conflicts among these various groups add to the difficulty of establishing supporting roles (when needed) in building supply chains. Manufacturing firms in African nations draw labor from a traditional agrarian society that has performed most different tasks in the past with little or no time limits set.

3. Technology

Technology is available throughout the world but may not be able to be supported in some areas. Expectations throughout the supply chain can be less or more than is possible to deliver. It is important to clearly understand the technology available and the impact on the supply chain. New technology is being introduced more and more, but the payback period, in some cases, is so long so as not to be an option. Training is another area that creates problems and issues. Training may be available in some languages and not in others and the training staff available may not be able to do the training in the local language.

Southeast Asia

Technology in this area ranges from "state of the art" to none. One can expect to find modern equipment in use in the main centers of commerce. Areas away from these centers tend to be lacking of technology, and more importantly, the means to support the technology, if available. Restrictive trade practices also impact the availability to import or export technology.

Indian Subcontinent

The Indian subcontinent is similar in nature to Southeast Asia on the technological front. There tend to be a few areas that have and

can support technology and others that continue to produce with old outdated equipment. In some cases the technology may be available but the pay back is so long that it is not economically feasible. Additionally, technology may have the effect of worker displacement, an effect that cannot be permitted in areas of massive unemployment and growing populations.

Latin America

This area now supports some of the most modern and technologically advanced facilities in the world. Many U.S. companies have invested heavily, especially in Mexico, and either through wholly owned facilities or joint ventures provided the capital and expertise to support the technology and the resources to make the technology work. Training the work force and the technicians to support the new technology is an ongoing requirement and a continuing challenge as the educational background and technical needs change.

Former Soviet Union Republics

The economies in the republics of former Soviet Union neither have the capability to use of advanced technologies nor the resources to support them.

Africa

There has been some progress in the availability of technology in Africa. However, advanced technologies are still in the early development stages in the continent. Investment has not substantially moved this development along, but is improving and likely to increase.

4. Production Processes

Standard operating procedures from one country to another vary greatly. Legal requirements complicate the supply chain as well. The processes could be improved and lead times could be reduced.

However, in some cases, those may not be feasible due to social responsibilities of the local company to provide jobs. Product costing is carried out based on the costs incurred in the past using given combinations in the global supply chain. As and when new supply chains are created/used there is a time lag for the new costs to take effect. Sometimes, product costs are based on past cost data of only one link in the supply chain due to non-availability of accurate data from all links in the supply chain. Supplier arrangements are constantly being changed making the production process user friendly to reduce costs, down time, and throughput time.

Southeast Asia

The production processes in Southeast Asia are generally well defined and reasonably dependable. However, they lack flexibility. Departure from the plan is not expected or tolerated. Components are more likely to be locally obtained and regionally obtained as an exception. "Rush orders" are not usually entertained. The usual response by Southeast Asian managers to "rush orders" is "we'll try" or "do our utmost". The processes tend to be very traditional and incorporating new methods or technology is not a frequently followed practice.

Indian Subcontinent

The processes generally are defined (dedicated) for a product type, but may change often as the work requirements vary. Workstation efficiency is compromised in favor of employing more people. Legacy methods (that no longer are required because of component quality improvement) continue to be used increasing cost and lead times and decreasing productivity. In line quality procedures are good and the work is dependable. Final audit procedures conform to customer requirements. In-process control procedures are lacking as a working tool resulting in high work in process inventories and possibly rework.

Latin America

The production processes are well defined for the product; however, they are not flexible and not necessarily suited for small runs. Facilities in Mexico, Central America, and the Caribbean Basin most often fall under 807 or NAFTA arrangements. Plants in South America usually provide all the components and cater to a “full package”. High volume products, like jeans, are manufactured in large factories, which are well automated, and staffed according to needs. Modular production techniques are becoming more common in Latin America.

Former Soviet Union Republics

The facilities are often out dated and equipment is not fully functional. There are some exceptions to this where modern facilities and equipment are in place. Assembly line processes are common in the apparel industry. Components are not always available locally and it is not uncommon for the production to start elsewhere, do certain operation in country, returned to the original location to be finished. Production controls may be in place but not always followed.

Africa

U.S. apparel firms are attempting to use the production capacity in Africa as and when it comes available. Components may come from other parts of the world creating shortages or work stoppages from time to time. Assembly line manufacturing is the most common production process in use.

5. Supplier Arrangements

Supplier arrangements vary greatly from region to region and those arrangements take on unique situations. The supplier to the final customer may provide all the required supplies of his/her choosing or may be required by the client (U.S. apparel company) to choose

from specified suppliers. The apparel company may choose to supply all the components except the labor. Component supply companies, more and more, are making their products available at the point of assembly, reducing the time to acquire the components, cost, and production stoppages. There is also a trend toward component suppliers working together with assemblers to provide product at assembling locations by sharing warehouse space and employee time. Technical support by the apparel companies is now being made available regularly in the field (at specified locations of assembly). This technical support was lacking or inadequate and the assemblers were to “fend for it” on their own.

Southeast Asia

The final producer/assembler or agent often chooses component suppliers and the product is approved by the customer (U.S. apparel company). In some cases the producer must use a nominated supplier. In either case it is not uncommon for the producer to have little recourse with the component supplier in the case of poor quality or component failure. In cases where producers identify the component supplier there exists a greater opportunity for a relationship to be developed that benefits both parties. Personal and professional relationships are more important than operating through legally binding contracts. Action through the legal system in some countries takes an enormous amount of time. Legal requirements like Letters of Credit create additional problems. The customer must adapt to these requirements and operational differences to the way they want to do business, often requiring on the scene representation. Letters of Credit are required for major purchases of the producer and the customer. Additional requirements concerning quality, delivery, and quantity may be part of the Letter of Credit.

Indian Subcontinent

Of all the countries in Indian Subcontinent, India has the greatest “in country resource” for producers to obtain component products. Vertically integrated operations (producing fabric, cutting fabric,

sewing, and finishing) are also common in India. The other countries in the Subcontinent obtain all or part of the components from other countries. Letters of Credit are required for these various purchases. The customer (U.S. apparel company) may deal directly with the producer and/or the component suppliers. In some cases an agent may be the contact point.

Latin America

México is the only country in Latin America that falls under the North American Free Trade Agreement (NAFTA). Assembly/production plants in Mexico may be either a labor only arrangement or full package agreement. This is most often handled by direct billing but could be done with a Letter of Credit. 807 arrangements are done primarily in the Caribbean basin and Central America but are available for South America as well. Shipping costs generally make 807 not as viable for South America as regions closer to the U.S. These 807 arrangements are usually under a direct billing agreement. In either countries that fall under NAFTA or 807, some components may be supplied by the producer/assembler. Quality auditors from the customer (U.S. apparel company) review the work prior to shipment from the assembler's plant but the final acceptance is usually at the customer's distribution center in the U.S. Plants in South America normally operate under a "full package" deal and almost always use a Letter of Credit. Most often, primary fabric is supplied from the U.S., Brazil, Argentina, or Colombia.

Former Soviet Union Republics

The arrangement is most often with a third party agent with component supplied by the agent and sourced outside the former Soviet Republic. Letters of Credit are always used.

Africa

In Africa, the supplier arrangement is usually done through a third party with little direct contact between the producer and the

customer. The Letter of Credit is always used in carrying out the contract.

6. Transportation Infrastructure

Transportation requirements vary greatly around the world. U. S. apparel manufacturers could move materials in the form of cut fabric to Mexico and have the finished product in the form of the packaged garments relatively easily and effectively moved by truck. Finish products from most other places such as Southeast Asia and South Asia China are moved in container ships. In other areas, Russia for instance, trucks or trains may be used to a Baltic Sea or Black Sea port, and then to container ships. Cambodia requires a river vessel, a feeder vessel, and then a container ship. All of these methods effectively move product, but time is required for every additional step as well as the sailing schedule may be infrequent.

Southeast Asia

The region has many well-developed deep-water ports capable of handling ocean going container vessels. The transportation network internal to the countries is reasonably dependable. The old Indo-China area is an exception, however, lacking behind the rest of the region with internal transportation as well as ocean ports. Generally, containers (carrying the finished goods) in feeder vessels are consolidated in Singapore for onward movement to the U.S. Shipping schedules may not be adequate to meet the needs during peak production and require suppliers to carefully prioritize shipments. Float (transportation) time could be 40 days or more.

Indian Subcontinent

Internal transportation is inefficient due to poor roads, crowded highways, and "marginal" (unreliable) vehicles. Trains are not dependable for space availability or timeliness. Ocean ports are not adequate for the volume and lack many modern port applications. A feeder vessel to a major consolidation port is common in this part of

the world. Work stoppages due to labor or political disputes are not uncommon. Float (transportation) time could be 40 days or more.

Latin America

México is most often served with 18 wheel trucks over an excellent highway system. The secondary roads are not as good but adequate. Some product moves via ship. Transportation time can be scheduled in hours. The international ports (on both the Pacific Ocean and Atlantic Ocean) are well manned and efficient. Ships operating on regular schedules from good deep-water ports serve the Caribbean basin and Central America. Clearing customs at the port takes about one week. Internal transportation by truck is reasonably efficient. Regular schedules to South America by ocean going vessels are available. Float (transportation) time ranges from one to two weeks and finished product could be sent to either U.S. coast. Most internal truck transportation within Latin America is adequate.

Former Soviet Union Republics

Internal transportation on truck can be considered as "marginal" due to inadequate equipment and road conditions. There are some excellent deep-water ports in the region; however, shippers may lack adequate number of containers and the scheduled departures are infrequent.

Africa

Internal transportation by truck or train is not always dependable. There may be a shortage of containers from time to time. The float (transportation) time is 30 to 40 days.

Conclusions

In this paper, several challenges with regard to communication, cultural relationships, technology, production processes, supplier arrangements, and transportation infrastructure in different parts of the world for building a global supply chain in the apparel industry have been presented. Every region of the globe has certain advantages and disadvantages for the U.S. apparel company.

Through this research, it has been noted that problems in communication affect the developing of supply chains in the former Soviet Union Republics, Southeast Asia, and Africa. It is the language barrier in the first two regions mentioned, and it is the communication infrastructure in the third. Language barriers contribute to poorly understood specifications which impact the quality of the product received and the communication infrastructure causes delays in transmission of information resulting in longer lead times.

Differences between the cultures of a specific region of the world and that of the U.S. has a strong effect on establishing relationships by the U.S. apparel company in that region. This leads to longer time periods in establishing stable sources of supply in those regions. This results in delays in setting up reliable supply chains quickly as well as higher costs in doing business. Availability of current technology in parts of Southeast Asia, the Indian subcontinent, and Latin America improves the delivery speed, delivery reliability, and quality. The same cannot be said about the former Soviet Union Republics and Africa. Antiquated and inflexible production processes in the five regions impact the speed with which deliveries can take place. However, these systems have not adversely affected the costs substantially. The kind of supplier arrangements impacts the delivery speed and quality of the products sought by the U.S. apparel company. Supplier arrangements in Southeast Asia, the Indian subcontinent, and Latin America are more conducive for delivery reliability and quality as compared to those in the former Soviet Union Republics and Africa. Due to the proximity of Latin America to the U.S., transportation time is shortest from suppliers from that part of the world.

On balance, at the current moment, U.S. apparel companies could look to Latin America, Southeast Asia, and the Indian subcontinent for building supply chains to minimize overall costs, reduce delivery lead times, and to receive quality products. There is one single most important factor that compounds the challenges in building a global supply chain in the apparel industry. That is, the wide variance that exists in cultures, technological capabilities, and communications a transportation infrastructure across different regions of the world.

Future research needs to focus on identifying the mechanisms that could reduce the impact of that variance. Also, more in-depth studies need to understand what specific performance measures in terms of quality, delivery speed, delivery reliability, cost, and flexibility are used in which region/country of the world in the apparel industry. Some regions of the world may be more amenable for carrying out specific operations at a given stage in the apparel supply chain. Further research needs to be carried out on identifying the strengths of each region in optimizing and "rationalizing" the global supply chain in enhancing competitive capabilities of firms. There is a need to develop testable hypotheses from a variety of case studies on the subject. For example, one of the important questions that need to be addressed is which of the challenges (in terms of communication, culture, technology, production processes, supplier arrangements, or transportation infrastructure) would have the greatest impact on improving organizational performance (in terms of quality, delivery speed, delivery reliability, cost, and flexibility). It is imperative that several empirical studies (using in-depth questionnaires) should be carried to test such hypotheses. This preliminary effort (made in the current paper) in describing the challenges in building global supply chains in the apparel industry illustrates that there is a tremendous potential for in-depth empirical work in this area.

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