

## Supplier selection in small and medium sized firms: The case of the U.S. textile and apparel industry

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### Abstract:

#### **Purpose**

The purpose of this paper is to empirically examine supplier selection among small- and medium-sized firms in the US textile and apparel industry. For small- and medium-sized firms, one powerful method of improving the firm's competitiveness in the dynamic business environment is through strategic approach of supplier selection, which emphasizes supplier's contributions to the total product and to overall customer satisfaction.

#### **Design/methodology/approach**

Empirical survey-based research methodology was implemented and data were collected from small and medium firms in textile and apparel business in North Carolina, South Carolina, Georgia, California, and New York which are the major areas of the US textile and apparel industry.

#### **Findings**

This study demonstrates the supplier selection practices of the small- and medium-sized firms in the US textile and apparel industry and their perceptions of supply market and supplier evaluation systems. Results indicate that supplier selection criteria impact firm performance in different ways. Small- and medium-sized firms carry out supplier selection based on product quality, supplier responsiveness, and strategic consideration which positively impact overall customer service level and overall customer satisfaction.

#### **Originality/value**

This paper focuses on supply chain management practices, specifically the supplier selection issue in small- and medium-sized firms in the textile and apparel industry.

**Keywords:** Small-and medium-sized enterprises | Supplier selection | Supply chain management | The USA | The textile and apparel industry

### Article:

## 1. Introduction

Small- and medium-sized enterprises (SMEs) are critical to the health and dynamism of the global economy because of their flexibility and ability to innovate. They play a significant role in providing employment opportunities and supporting large scale organizations. With the rapid advancement in technology, the changing international environment in economic, political, and social conditions, and the erosion of trading boundaries, even the smallest of businesses now has the potential to trade in this global economy (Kumar and Liu, 2005). SMEs account for a majority of organizations in most developed economies (Graham, 1999; Berthon et al., 2008). Small businesses make up 99.7 percent of US employer firms (US Small Business Administration (SBA), 2014). US small businesses employed 56.8 million people, or 48.0 percent of the private workforce, in 2013 (US Small Business Administration (SBA), 2016). A total of 304,223 companies exported goods from the USA in 2013. Among these, 297,343, or 97.7 percent, were small firms; they generated 33.6 percent of the US's total known export value (US Small Business Administration (SBA), 2016).

The purpose of this study is to empirically examine the supplier selection practices among small- and medium-sized firms in the US textile and apparel industry. The reasons are many for conducting such a study. First, the global market has traditionally been the battlefield of large, multinational corporations. However, the past years have witnessed the evolution of a new global manufacturing and trade environment, with firms of all sizes now competing globally (Prater and Ghosh, 2005; Vaaland and Heide, 2007). Primarily most of the research findings have been with organizations in general (Kannan and Tan, 2002; Oke et al., 2009; Lao et al., 2010) or focusing on the practices of multinational corporations neglecting the fact that small- and medium-sized firms and large firms do not operate in similar ways (Prater and Ghosh, 2005; Dana et al., 2007; Sinha et al., 2011). There is much evidence of the need for close relationships (between partners), often referred to as “supply partnerships,” for supply chains to function with maximum benefit to all partners. This has led to the need for the establishment of realistic working standards and practices between companies of all sizes, not necessarily confined to those between larger firms (Vaaland and Heide, 2007). SMEs have a greater need to gain competitive advantage by controlling unit cost and for greater interaction between the buyer and the supplier (Park and Krishnan, 2001). While a lot of research on supply chain management (SCM) has focused generally on larger organizations, or from the larger organizations' perspective, this paper focuses on SCM practices, specifically the issue of supplier selection, in small- and medium-sized firms. The intent of this paper is not to compare and contrast the practices between SMEs and large firms. However, the purpose of this research is to present the SCM practices having been followed by SMEs.

Second, the textile and apparel industry is a typical representative of small- and medium-sized businesses in the US economy. About 98 percent of firms in the US textile and apparel industry have less than 500 employees (US Census Bureau, 2016). Small- and medium-sized firms contribute significantly to a country's gross domestic product, national employment, and export performance (Graham, 1999; Berthon et al., 2008). The results of this study will expand the existing literature by choosing a dynamic industry – the textile and apparel industry, which is mainly composed of small- and medium-sized firms.

Third, the current situation of the US textile and apparel companies functions as the stimulus to investigate the new opportunities for managers in those organizations. The textile and apparel industry is truly global in nature (Su, 2013) and all types of the US textile and apparel firms, especially SMEs have been actively involved in global sourcing activities for more than decades. Therefore, it is important to know the SCM practices, specifically supplier selection practices of SMEs in the textile and apparel industry and to explore the managers' perceptions of the business environment in those organizations.

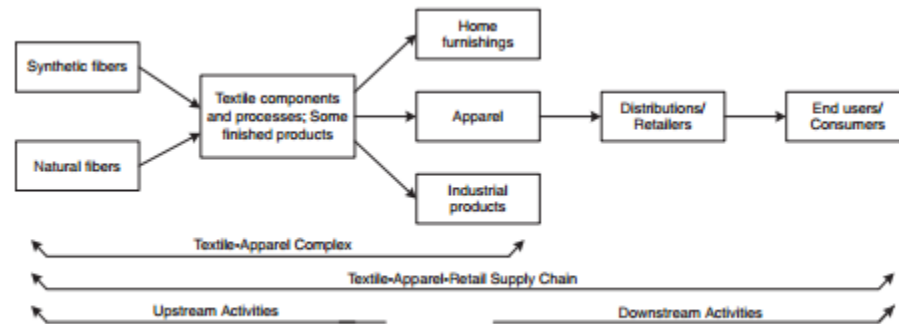
The paper is structured as follows. Following this introduction, the next section presents the key characteristics of the US textile and apparel supply chain. The Section 3 reviews the relevant literature on SCM and supplier selection. Then, the Section 4 discusses research methodology used in the study including research instrument, sample, and data collection. The Section 5 offers the results of the data analysis. Finally, the paper concludes with implications for managerial practice and future research.

## **2. The US textile and apparel supply chain**

The textile and apparel manufacturing is one of the oldest manufacturing industries in the world and the textile and apparel supply chain is truly global. The comprehensive textiles and apparel supply chain, which encompasses all of the activities of the textile-apparel complex as well as the functions of distribution and retail operations to the end users/consumers is depicted in Figure 1 (Dickerson, 1999). Traditionally, the US textile and apparel industry is highly fragmented with little coordination. In the past, each segment in the US textile-apparel complex operated more or less separately, producing intermediate products for the next stage in the production chain. Fragmentation has made the textile and apparel industry more vulnerable in facing global competition (Dickerson, 1999; Bruce and Daly, 2011) because historically the industry has been comprised primarily of small- and medium-size firms (Sullivan and Kang, 1999; Adewole, 2005; Jin, 2006; Stoll and Ha-Brookshire, 2012; Hodges et al., 2016). With the development of communication and transportation, more and more SMEs now are actively involved in offshore production and international market; however, little is known about the SCM practices from the perspectives of the SMEs in the textile and apparel industry (Dana et al., 2007; Stoll and Ha-Brookshire, 2012).

Historically, firms in the textile and apparel industry have purchased products at low costs through buying power, or via access to the cheapest domestic and international sources for apparel (Dickerson, 1999; Gereffi and Memedovic, 2003; Abernathy et al., 2006). International sourcing arrangements over the last 20 years reflected a quest for minimizing unit labor costs (Gereffi, 1999; Gereffi and Memedovic, 2003; Kumar and Arbi, 2008). As the level of global competition has intensified, due primarily to the increasing globalization of manufacturing and service, many firms are carefully evaluating their purchasing function, and the contribution of purchasing and suppliers to the firms. Manufacturers that rely on international sourcing therefore have to reassess the total costs associated with offshore production and revise existing arrangements (Platts and Song, 2010; Su, 2013). Furthermore, more and more companies realize that a significant percentage of the final quality of a product is determined in the early design and manufacturing stages of components that make up a significant part of the product (Petersen et al., 2005). The increasing interdependency of the textile-apparel supply network to achieve

innovation, efficiency, flexibility, and high quality will support stronger strategic approaches which emphasize stronger partnership-based alliances rather than the traditional adversary-based approaches (Teng and Jaramillo, 2006; Su and Gargeya, 2012b; Su, 2013).



**Figure 1.**  
Textile-apparel-retail supply chain

Source: Dickerson (1999)

Over the last two decades, the US textiles-apparel complex has experienced and is still experiencing radical and continuous change in their product, process, and business (Kilduff, 2001; Teng and Jaramillo, 2006; Kumar and Arbi, 2008; Su, 2013). The unpredictable dynamics of the US textile and apparel supply chain arise from various environmental uncertainties and risks, including external and internal factors (Yi et al., 2011). The intricate nature of the sector is reflected in the numerous steps in the chain, the diversity of activities, the fragmentation of the market, and the varying product and quality specifications being managed. There is increasing tendency for each type of organizational buyer in the US textile and apparel supply chain to become more actively involved in global sourcing (Gereffi and Memedovic, 2003; Su et al., 2009; Su, 2013). The globalization of the US textile and apparel industry has been significantly spurred by international textile and apparel trade regulations such as the North American Free Trade Agreement, the Caribbean Basin Initiative, the elimination of quotas on January 1, 2005 and the free trade agreements between the USA and other countries like Australia, Dominican Republic, Chile, Israel, Jordan, Korea, Morocco, Peru, Singapore, etc. (Office of Textiles and Apparel (OTEXA) – US Department of Commerce, 2016).

### 3. Supplier selection in the SMEs context

SCM focuses on how firms utilize their suppliers' processes, technology, and capability to enhance competitive advantage. A company, in order to compete effectively in the world market, must have a network of competent suppliers and must build on the expertise and commitment of its suppliers. One of the most important objectives of the purchasing function is the development of a network of competent suppliers (Handfield and Nichols, 2004; Su and Gargeya, 2012a). Supplier selection is designed to create and maintain such a network and to improve various supplier capabilities that are necessary for the buying organization to meet its increasingly competitive challenges. The importance of supplier selection comes from the fact that it commits resources while simultaneously impacting such activities as inventory management, production planning and control, cash flow requirement, and product quality, and ultimately influencing firm's business performance. Supplier selection involves factors that an organization uses when selecting and evaluating key/preferred suppliers' performance (Tan et al., 2002). Manufacturers in the textile and apparel industry have realized that a well-defined and effectively

communicated set of criteria to select and evaluate suppliers is one important approach that may enable firms to improve manufacturing and/or service performance. The supplier selection criteria help a firm identify vendors that can provide excellent product quality, performance, availability, and consistent delivery (Petersen et al., 2005; Giunipero et al., 2006). A firm's ability to produce a quality product at a reasonable cost and in a timely manner is heavily influenced by its suppliers' capabilities, and supplier performance is considered one of the determining factors for the company's success (Tan et al., 2002; Petersen et al., 2005; Lao et al., 2010; Su and Gargeya, 2012a). The results of Tracey and Vonderembse (2000) showed the importance of supplier selection criteria and also demonstrated that the use of supplier involvement has direct and significant impacts on supplier performance and that in turn has a direct and significant impact on manufacturing performance.

There are several key reasons why suppliers are becoming increasingly critical to the competitive success of the US firms in the textile and apparel industry. First, US manufacturers are more and more focused on their core competences (Prahalad and Hamel, 1990) and areas of technical expertise by concentrating on what they do best. An emphasis on internal competences requires greater reliance on external suppliers to support non-core requirement directly. Second, developing effective supply base management strategies can help counter the competitive pressures brought about by intense worldwide competition. To remain globally competitive, firms in the US must receive competitive advantages from their suppliers that match or exceed the advantages that the suppliers provide to leading foreign competitors. Third, suppliers can directly support a firm's ability to innovate in the critical areas of product and process technology (Bordonaba-Juste and Cambra-Fierro, 2009). As organizations continue to seek performance improvements, they are reorganizing their supplier base and managing it as an extension of the firm's business system (Holmen et al., 2007).

Supplier selection becomes a central concern as the buyers look to form strategic supply chain partnerships (Spekman, 1988; Giunipero et al., 2006; Yigin et al., 2007; Bordonaba-Juste and Cambra-Fierro, 2009). A growing emphasis on establishing long-term channel relationships, driven by competitive pressures, conditions of uncertainty environment and business complexity, has encouraged many firms to become highly selective in their choice of suppliers (Pressey et al., 2007; Bordonaba-Juste and Cambra-Fierro, 2009; Wu, 2009). To build more effective relationships with suppliers, organizations are using supplier selection criteria to strengthen the selection process. Effective evaluation and selection of suppliers is considered to be one of the critical responsibilities of purchasing/sourcing managers. The evaluation process often involves the simultaneous consideration of several important supplier performance attributes including price, delivery lead time, and quality. Simpson et al. (2002), based on a survey of 299 purchasing managers, noted that less than half the firms have a formal supplier evaluation process in place. They also noted that quality, supplier certification, facilities, continuous improvements, physical distribution factors, and channel relationship factors were the elements that were most commonly included in supplier evaluation programs.

For SMEs, supply chain integration is one of the most significant challenges of modern management (Gélinas and Bigras, 2004; Vaaland and Heide, 2007). More and more SMEs are under pressure from large manufacturing enterprises to re-examine and modify their traditional management styles, both operationally and organizationally, to be able to survive in the

environment of intense global competition (Vaaland and Heide, 2007; Sinha et al., 2011; Stoll and Ha-Brookshire, 2012). For small- and medium-sized firms, strategically managing their supply chain can be an effective way to diffuse new technologies rapidly, to enter new markets, to bypass governmental restrictions, and to learn quickly from the leading companies in a given field. SMEs, given the limited resources they have, will be able to reap the most benefits from SCM practices as they can tap into other members' expertise in the supply chain.

A review of previous research indicated that for most of the studies regarding the effect of SCM practices on firm performance, the samples were characterized by considerable variance in firm size, and data were analyzed aggregately (Vonderembse and Tracey, 1999; Kannan and Tan, 2002; Simpson et al., 2002; Tan, 2002; Su et al., 2009; Koufteros et al., 2012; Su and Gargeya, 2012a; Su, 2013). There are limited number of studies that have specifically investigated SCM practices in the SMEs context (Park and Krishnan, 2001; Gélinas and Bigras, 2004; Prater and Ghosh, 2005; Vaaland and Heide, 2007; Bordonaba-Juste and Cambra-Fierro, 2009; Sinha et al., 2011), but most of them are not from the textile and apparel industry or from supplier selection perspective. For example, Bordonaba-Juste and Cambra-Fierro (2009) conducted case study suggesting how firms must adapt their supply relationships both with suppliers and with the environment. Gélinas and Bigras (2004) maintained that it is important to examine the characteristics and features of SMEs in order to identify those favorable and unfavorable to logistics integration. Park and Krishnan (2001) examined the 78 SMEs in the midwest US from various industries to better understand the supply chain practices of small businesses. Prater and Ghosh (2005) presented descriptive results regarding current operational practices of the US SMEs (in various industries) in Europe. Vaaland and Heide (2007) focused on SMEs and the extent to which they are prepared to meet SCM challenges based on a cross-sectional survey of 200 Norwegian companies with informants mainly related to the SCM function and from top management.

Our review of literature also revealed that very limited research from the textile and apparel industry examined the SMEs' business practices. Using case study design method in the New Zealand apparel industry, Dana et al.'s (2007) study extended the existing literature on the potential advantages and drawbacks of domestic and offshore manufacturing strategies to a small firm perspective. Stoll and Ha-Brookshire (2012) explored SMEs' motivations for success by the content analysis of the text data from two prominent small business magazines. Teng and Jaramillo's (2006) study provided an illustration of South American small- to medium-sized companies in the textile/apparel industry concerning SCM issues using the descriptive results from a very small survey sample.

In summary, our extensive review of the literature indicates that although the literature is rich on SCM in general, there is a scarcity of research papers when more specific contexts, such as SMEs, are considered. The link between the practices adopted and the performance obtained by SMEs are not clear, explicit, or univocal (Islam and Karim, 2011). Furthermore, while the literature on various aspects of supply chain strategy creation and/or textile and apparel supply chain has recently started to develop, the careful examination of the literature indicates little has specifically addressed supplier selection in the context of SMEs in the textile and apparel industry. Therefore, the current study describes a research effort to fill this research gap by

investigating supplier selection by means of empirical data from SMEs in the US textile and apparel industry.

#### **4. Research methodology**

A survey instrument (in the form of a structured questionnaire) was designed based on the literature review of previous research and discussions with industrial practitioners and was used to collect the data for the study. All questions were designed to be in such a manner that they had to be answered (by the respondents) from the buyer's perspective using a five-point Likert scale. For example, respondents were asked to indicate the importance of the supplier selection practices, using a five-point Likert scale (1=not at all important, 5=extremely important).

24 supplier selection criteria were included in this study based on the literature review (Choi and Hartley, 1996; Narasimhan and Jayaram, 1998; Vonderembse and Tracey, 1999; Tracey and Tan, 2001; Kannan and Tan, 2002; Pidduck, 2006; Paulraj and Chen, 2007) and the researchers' discussions with practitioners in the industry. To elicit information on firm performance, respondents were asked to indicate, using a five-point Likert scale (a score of 1 denoted that the performance decreased significantly and a score of 5 denoted performance increased significantly), their company's performance in terms of return on assets, profit margin, market share, overall competitive position, overall customer service level, and overall customer satisfaction over the past three years (Carr and Pearson, 1999, 2002; Kannan and Tan, 2002; Tan et al., 2002). In addition, respondents were asked to indicate their firms' supplier evaluation systems and the situation of the firm's supply market, using a similar five-point Likert scale. Several demographic questions were also presented in the questionnaire to provide insights of firm operations. The survey instrument was pre-tested for content validity by nine purchasing managers. Where necessary, questions were reworded to improve validity and clarity.

The survey sample included small and medium firms in textile and apparel business in North Carolina (NC), South Carolina (SC), Georgia (GA), California (CA), and New York (NY). These states are the main areas of the US textile and apparel industry. The survey was sent to 320 small- and medium-sized firms in NC, SC, GA, CA, and NY, randomly selected from Dunn and Bradstreet's million dollar database and two textile directory books. The target respondents (for the survey) were purchasing professionals with titles such as purchasing manager, director of purchasing, and vice president of purchasing. In an effort to increase response rate, Dillman's (2000) tailored design method was used, including one mail survey, follow-up phone calls, and e-mail survey and e-mail contacts. Of the total, 320 surveyed firms, 40 firms declined to participate in the survey because of the company's no survey policy; five companies were closed down; five companies were not in the textile and apparel business anymore; and 53 firms were identified as non-reachable or returned undelivered (due to a wrong address). In total, 63 usable responses were returned from 217 reachable firms in the sample within the required time period, representing an effective response rate of 29.0 percent.

A comparison was made between those respondents who responded immediately with those who responded after follow-up steps were implemented to examine non-response bias. t-Tests were performed on the 20 randomly selected items. The t-tests yielded no statistically significant

difference among the early and late respondents, suggesting that non-respondent bias does not exist in this study.

## **5. Analysis and results**

### ***5.1 Demographic statistics***

Table I provides the firm characteristics of the survey sample results. Approximately 47.6 percent of responses came from the textile industry, 52.4 percent from the apparel industry. The titles of the respondents are mainly director of purchasing/sourcing (22.2 percent), CEO/president (15.9 percent), general manager (14.3 percent), and vice president of sourcing/purchasing or VP of logistics/operations (22.2 percent). Companies with fewer than 100, 100-249, and 250-499 employees represented 23.8 percent, 44.4 percent and 30.2 percent of the responses, respectively. In total, 76 percent of the companies had annual gross sales less than US\$100 million. About 14.3 percent of companies did not provide annual gross sales information.

### ***5.2 Supplier selection practices***

Almost all of the firms (over 90 percent of the respondents) agreed or strongly agreed the following statements: sourcing/purchasing function is very important to the overall success of their companies; the sourcing function adds value to the firm in the area of production/operations/logistics; and sourcing contributes to the firm's bottom-line profit.

In terms of the sourcing area, 51 respondents (81 percent) indicated that they implemented global sourcing, and only 12 respondents (19 percent) indicated that they only focused on domestic sourcing in the USA. For those which took advantage of global sourcing, China (mainland) and Hong Kong, Northeast Asia, South Asia, and Mexico were identified as the top global sourcing areas. These areas are also the major regions in the world for textile and apparel manufacturing and distribution.



Characteristics	Frequency	%	US textile and apparel industry
<i>Industry distribution</i>			
Textile industry	30	47.6	
Apparel industry	33	52.4	
<i>Title of the respondents</i>			
Director of purchasing/sourcing	14	22.2	<b>173</b>
CEO/president	10	15.9	
General manager	9	14.3	
Vice president (VP-operations, VP-sales, VP-logistics)	9	14.3	
Vice president of purchasing/sourcing/materials management	5	7.9	
Purchasing agent	2	3.2	
Director of manufacturing	2	3.2	
Sales manager	2	3.2	
Chief operating officer (COO)	1	1.6	
Others	9	14.3	
<i>Number of employees</i>			
Less than 100	15	23.8	
100-249	28	44.4	
250-499	19	30.2	
Missing	1	1.6	
<i>Annual gross sales (US\$)</i>			
Less than 5 million	7	11.1	
5-24.9 million	20	31.7	
25-49.9 million	9	14.3	
50-99.9 million	12	19.0	
100-500 million	5	7.9	
Over 500 million	1	1.6	
Missing	9	14.3	
Total	63	100	<b>Table I.</b> Firm sample characteristics

The survey results clearly show that many changes in the supply market have been reported by the respondents in the study (Table II). Over 71 percent of the respondents indicated that the supplier's methods used to produce products or services have changed to some extent or to great extent. Over 93 percent of the respondents indicated that the geographic location from which they procure products or services is more dispersed. Over 62 percent of the respondents reported that the number of suppliers offering materials that meet their specification requirements has increased to some extent or to great extent. Over 62 percent of the respondents reported that the availability of substitute materials has increased to some extent or to great extent. Previous research conducted by Kannan and Tan (2002) found that more than 50 percent of respondents reported an increase in outsourcing activities for primary materials and component parts; approximately 50 percent of respondents indicated that their firms had increased the number of key suppliers they used, and 40 percent reported a decrease in their supplier base for primary materials and component parts over the previous three years. Compared with the results of Kannan and Tan (2002), the present study demonstrates the dynamic changes in the supply market for SMEs in the textile and apparel industry.

Supply market	% To a great extent				
	To no extent			To a great extent	
	1	2	3	4	5
The supplier's methods used to produce products or services have changed	6.3	22.2	31.7	23.8	15.9
The geographic location from which we procure products or services is more dispersed	4.8	1.6	28.6	42.9	22.2
The number of suppliers offering materials that meet our specification requirements has increased	17.5	20.6	17.5	31.7	12.7
The availability of substitute materials has increased	9.5	28.6	30.2	22.2	9.5

**Table II.**  
Supply market

In terms of supplier evaluation systems (Table III), about 26 percent of the respondents reported that they agreed or strongly agreed that they had a formal supplier certification program, while 30.6 percent strongly disagreed with the statement that they had a formal supplier certification program. Only 42 percent agreed or strongly agreed that their company had a formal system to track the performance of the suppliers. Only about 27 percent agreed or strongly agreed that their company had a formal program for evaluating and recognizing suppliers. Previous research findings indicated that nearly 50 percent of the companies in different industries have a formal supplier evaluation process (Simpson et al., 2002; Teng and Jaramillo, 2005). Compared with previous studies, the results from the present study clearly show that many small- and medium-sized firms in the textile and apparel industry did not formally implement supplier evaluation system. Teng and Jaramillo (2005) argued that most evaluation methods rely on industry certifications or heuristics indicators for supplier performance evaluation, which on occasion may omit the business synergy. Tan (2002) showed that slightly more than half (50.4 percent) of the respondents were ISO 9000 series certified, and approximately 60 percent maintained some form of supplier certification program. Teng and Jaramillo (2006) surveyed South American small- to medium-sized companies in the textile/apparel industry and they reported that just 37.5 percent of the companies are ISO 9000 certified, and from those that have not received certification, 50 percent have not even included getting ISO certified as an important icon in their future plans. Clearly, compared with previous research, the findings from the present study is surprising and may indicate a warning sign for the SMEs in the textile and apparel industry.

Survey questions	$\chi^2$	df	Sig.
<i>Supply market</i>			
The supplier's methods used to produce products or services have changed	3.016	4	0.555
The geographic location from which we procure products or services is more dispersed	3.235	4	0.519
The number of suppliers offering materials that meet our specification requirements has increased	8.025	4	0.091
The availability of substitute materials has increased	4.619	4	0.329
<i>Supplier evaluation systems</i>			
We have a formal supplier certification program	1.787	4	0.775
Our company has a formal system to track the performance of the suppliers we deal with	6.016	4	0.198
Our company has a formal program for evaluating and recognizing suppliers	1.776	4	0.777
<b>Note:</b> The relationship between firm types (textile firms and apparel firms) and the response frequencies of the survey questions			

**Table IV.**  
 $\chi^2$ -test by firm types

Supplier selection criteria	Mean	SD
On-time delivery	4.619	0.633
Trust	4.603	0.610
Quality level	4.603	0.636
Price/cost of product	4.524	0.592
Quick response time	4.413	0.687
Communication openness	4.397	0.708
Honest and frequent communication	4.381	0.771
Customer service	4.302	0.733
Correct quantity	4.254	0.782
Willingness to continuously improve the product and process	4.206	0.722
Flexibility to respond to unexpected demand changes	4.191	0.737
Availability of resources	4.175	0.834
Technical expertise/capability	4.159	0.827
Past and current relationship	4.143	0.859
Financial stability and staying power	4.079	0.829
Communication skills/system (phone, fax, internet)	4.079	0.867
Industry knowledge	3.968	0.861
Reputation of supplier	3.889	0.918
Supplier has strategic importance to your firm	3.873	1.039
Trade regulations	3.540	1.148
Profitability of supplier	3.381	0.923
Presence of certification or other documentation	3.159	1.260
Business culture match between the companies	2.952	1.128
Geographical compatibility/proximity	2.873	1.010

**Table V.**  
Descriptive statistics  
of supplier selection  
criteria

Chi-square tests were used to examine whether there is an association between firm types (textile firm and apparel firm) and the respondents' responses to the survey questions (Table IV).  $\chi^2$  results reveal that the response distribution of the survey questions regarding supply market and supplier evaluation systems is not related to the firm type (whether it is a textile firm or an apparel firm).

Table V shows the mean values of the 24 supplier selection practices which were included in the survey, which can be compared as a measure of relative perceived importance of the supplier attributes. Results show that on-time delivery, trust, quality level, price/cost of product, quick response time, communication openness, and honest and frequent communications, and customer service are the most important supplier evaluation criteria, with the highest mean values and relatively small standard deviations (Table V). Not surprisingly, on-time delivery, quality, price/cost of product, and quick response time are among the most common criteria, and this

study is consistent with previous research. Honesty and trust are also critical supplier selection criteria in business transaction and in building the good buyer-supplier relationship. However, geographical compatibility/proximity and business culture match between the companies are the two least important criteria. The results also show small- and medium-sized firms laid less emphasis on presence of certification, trade regulations, and profitability of suppliers, which have smaller mean values. Furthermore, a one-way ANOVA indicated significant differences in the means of 24 supplier selection criteria ( $F=21.672$ ,  $p<0.001$ ).

### ***5.3 Relationship between supplier selection criteria and firm performance***

We use Spearman rank-order correlation (Spearman's  $\rho$ ) to examine the relationship between the 24 supplier selection criteria and the six dimensions of firm performance (Table VI).

Spearman correlation results show that some supplier selection criteria have strong relationship with firm performance (Table VI). On-time delivery, which is rated as the most important supplier selection criterion (Table V), is strongly associated with overall customer service level and overall customer satisfaction at  $\alpha=1$  percent level. Quality level, which is rated as the third most important supplier selection criterion, is strongly related to profit margin at  $\alpha=5$  percent level, and is strongly related to overall customer service level and overall customer satisfaction at  $\alpha=1$  percent level. Quick response time, which is rated as the fifth most important supplier selection criterion, is strongly associated with market share, overall competitive position, and overall customer service level at  $\alpha=5$  percent level. Communication openness, honest and frequent communication, customer service, correct quantity, willingness to continuously improve the product and process, flexibility to respond to unexpected demand changes, and availability of resources, which were rated by the respondents as medium to high in terms of the importance in supplier selection, are strongly related to overall customer service levels and/or overall customer satisfaction.

Several supplier selection criteria have no strong association with performance. Trust (the second most important supplier selection criterion) and price/cost of product (the fourth most important supplier selection criterion) have no strong association with firm performance. Technical expertise/capability, past and current relationship, and communication skills/system, which were rated medium in importance level, have no strong relationship with performance. Geographical compatibility/proximity, which was rated least important supplier selection criterion, is not strongly related to performance.

It is interesting to note that some supplier selection criteria which were not rated as important supplier selection practices have strong association with firm performance, especially overall customer service levels and overall customer satisfaction. Reputation of suppliers, which was rated less important, is strongly related to return on asset and overall customer service at  $\alpha=5$  percent level and is strongly related to profit margin and overall customer satisfaction at  $\alpha=1$  percent level. Supplier's strategic importance, trade regulations, profitability of supplier, and presence of certification or other documentation, which were rated by the respondents less important, are strongly related to overall customer service levels and overall customer satisfaction. Moreover, business culture match between the companies, which was rated by the respondents the second least important supplier selection criterion, is strongly related to return on

asset and market share at  $\alpha=5$  percent level, and is strongly related to overall customer satisfaction at  $\alpha=1$  percent level.

Supplier selection criteria	Return on asset	Profit margin (%)	Market share	Overall competitive position	Overall customer service levels	Overall customer satisfaction
On-time delivery	ns	ns	ns	ns	0.417**	0.373**
Trust	ns	ns	ns	ns	ns	ns
Quality level	ns	0.300*	ns	ns	0.520**	0.465**
Price/cost of product	ns	ns	ns	ns	ns	ns
Quick response time	ns	ns	0.280*	0.295*	0.312*	ns
Communication openness	ns	ns	ns	ns	0.267*	ns
Honest and frequent communication	ns	ns	ns	ns	0.349**	0.255*
Customer service	ns	ns	ns	ns	0.370**	0.308*
Correct quantity	ns	ns	ns	ns	0.367**	0.373**
Willingness to continuously improve the product and process	ns	ns	ns	ns	0.375**	0.311*
Flexibility to respond to unexpected demand changes	ns	ns	ns	ns	0.283*	ns
Availability of resources	ns	ns	ns	ns	0.249*	ns
Technical expertise/capability	ns	ns	ns	ns	ns	ns
Past and current relationship	ns	ns	ns	ns	ns	ns
Financial stability and staying power	ns	ns	ns	ns	ns	0.270*
Communication skills/system (phone, fax, internet)	ns	ns	ns	ns	ns	ns
Industry knowledge	ns	ns	ns	ns	ns	0.265*
Reputation of supplier	0.268*	0.334**	ns	ns	0.265*	0.365**
Supplier has strategic importance to your firm	ns	ns	ns	ns	0.357**	0.324**
Trade regulations	ns	ns	ns	ns	0.282*	0.284*
Profitability of supplier	ns	ns	ns	ns	0.316*	0.344**
Presence of certification or other documentation	ns	ns	ns	ns	0.354**	0.401**
Business culture match between the companies	0.279*	ns	0.303*	ns	ns	0.362**
Geographical compatibility/proximity	ns	ns	ns	ns	ns	ns

Notes: ns, Spearman's  $\rho$  is "non-significant" at the 0.05 level (two-tailed). \*\*Spearman's  $\rho$  is significant at the 0.05 and 0.01 level, respectively (two-tailed)

**Table VI.**  
Spearman's  $\rho$  correlation analysis results

#### 5.4 Exploratory factor analysis (EFA) and multiple regression analysis

An EFA was carried out to reduce a scale to a smaller number of underlying factors. The initial EFA using principal component analysis with varimax rotation indicates that the item quality level has low loading scores and is not loaded with other items meaningfully on any of the factors; for the item price/cost of product, there is no strong association between the item price/cost of product and most of other items (most of the correlation coefficients between the item price/cost of product and all other items are non-significant and less than 0.200). Therefore, these two items, quality level and price/cost of product, can be seen as two single item factors, and were omitted from subsequent factor analysis.

The remaining 22 supplier selection items were reduced to five underlying factors (Table VII). The KMO measure of 0.826 and the Bartlett's test statistic ( $p < 0.000$ ) indicate that the data are appropriate for factor analysis. The EFA solution was determined using the following criteria: eigenvalue ( $> 1$ ), variance explained by each component, scree plot, loading score for each factor ( $\geq 0.5$ ), and meaningfulness of each dimension. As a result, five factors were extracted, which explains approximately 69.96 percent of the total variance. These five factors include supplier responsiveness ( $\alpha = 0.903$ ), strategic consideration ( $\alpha = 0.824$ ), supplier capability ( $\alpha = 0.843$ ), relationship ( $\alpha = 0.806$ ), and compatibility ( $\alpha = 0.645$ ). Supplier responsiveness consists of honest and frequent communication, quick response time, on-time delivery, communication skills/system, availability of resources, willingness to continuously improve the product and process, customer service, and flexibility to respond to unexpected demand changes. Strategic consideration includes presence of certification or other documentation, profitability of supplier, trade regulations, and supplier's strategic importance. Supplier capability consists of supplier's industry knowledge, technical expertise/capability, correct quantity, financial stability and staying power, and reputation. The supplier performance attributes that reflect relationship include past and current relationship, trust, and communication openness. Finally, the compatibility factor includes geographical compatibility/proximity and business culture match between the companies. Adding the two single item factors – product quality and price/cost of product, the 24 supplier selection criteria were reduced to seven aspects of supply selection: product quality, price/cost of product, supplier responsiveness, strategic consideration, supplier capability, relationship, and compatibility. In addition, it is interesting to note that the supplier selection criteria which are strongly associated with overall customer service levels and overall customer satisfaction (Table VI) mainly reflect the three aspects of supply selection, namely, product quality, supplier responsiveness, and strategic consideration.

Factor	Supplier evaluation criteria	Factor loadings	$\alpha$
Supplier responsiveness	Honest and frequent communication	0.833	0.903
	Quick response time	0.775	
	On-time delivery	0.755	
	Communication skills/system (phone, fax, internet)	0.745	
	Availability of resources	0.652	
	Willingness to continuously improve the product and process	0.626	
	Customer service	0.606	
Strategic consideration	Flexibility to respond to unexpected demand changes	0.572	0.824
	Presence of certification or other documentation	0.854	
	Profitability of supplier	0.731	
	Trade regulations	0.694	
	Supplier has strategic importance to your firm	0.644	
Supplier capability	Industry knowledge	0.840	0.843
	Technical expertise/capability	0.764	
	Correct quantity	0.616	
	Financial stability and staying power	0.523	
	Reputation of supplier	0.469	
Relationship	Past and current relationship	0.804	0.806
	Trust	0.742	
	Communication openness	0.537	
Compatibility	Geographical compatibility/proximity	0.908	0.645
	Business culture match between the companies	0.612	

**Notes:** Kaiser-Meyer-Olkin (KMO): 0.826; Bartlett's test statistic:  $p < 0.000$

**Table VII.**  
Factor analysis  
results of supplier  
selection criteria

A series of standard multiple regression analysis were performed with each of the six dimensions of firm performance as the dependent variable and the seven aspects of supply selection as the independent variables (quality, price/cost of product, supplier responsiveness, strategic consideration, supplier capability, relationship, and compatibility). As shown in Table VIII, regression analysis revealed that firm overall customer service levels and overall customer satisfaction were significantly predicted by the model. Quality level and strategic consideration each significantly predicted overall customer service levels and overall customer satisfaction.

## 6. Conclusion and implications

In this study, we empirically investigated textile and apparel SMEs. SMEs have not received sufficient attention from the research community because it is generally assumed in operations management research that manufacturing practices are equally applicable to SMEs and large firms (Islam and Karim, 2011). And the SME literature emphasizes the importance of the technical and technological capabilities but operational management is not assumed to be a critical area for improvement (Islam and Karim, 2011). Considering the US textile and apparel industry is significantly composed of SMEs, it is meaningful to explore SCM practices (specifically supplier selection practices) from the SMEs' perspective. This study attempts to fill this gap in the literature.

Model	$\beta$	Sig.	$R^2$
Dependent variable: overall customer service levels $F(7, 55) = 4.212, p < 0.001$			0.349
<i>Predictors</i>			
Quality level	0.403**	0.003	
Price/cost of product	-0.150	0.227	
Supplier responsiveness	0.331	0.090	
Strategic consideration	0.314*	0.031	
Supplier capability	-0.136	0.425	
Relationship	-0.246	0.114	
Compatibility	-0.068	0.588	
Dependent variable: overall customer satisfaction $F(7, 55) = 4.395, p < 0.001$			0.359
<i>Predictors</i>			
Quality level	0.352**	0.009	
Price/cost of product	-0.108	0.379	
Supplier responsiveness	0.117	0.542	
Strategic consideration	0.298*	0.038	
Supplier capability	0.130	0.441	
Relationship	-0.342*	0.029	
Compatibility	0.116	0.348	
Dependent variable: return on asset $F(7, 52) = 1.366, p = 0.239$ (ns)			0.155
Dependent variable: profit margin $F(7, 52) = 1.339, p = 0.251$ (ns)			0.153
Dependent variable: market share $F(7, 52) = 1.069, p = 0.396$ (ns)			0.126
Dependent variable: overall competitive position $F(7, 55) = 0.675, p = 0.692$ (ns)			0.079
<b>Notes:</b> ns, means "non-significant" at the 0.05 level. ** $p < 0.01$ ; * $p < 0.05$			

**Table VIII.**  
Multiple regression analysis results

The findings of the study are in line with previous literature, but provide many new insights from SMEs' perspective. It is evident that the supply market of the US textile and apparel industry changed and is still changing. For example, the supplier's methods used to produce products or services have changed; the textile and apparel suppliers are more geographically dispersed. Top managers are realizing the importance and the contributions purchasing/sourcing could provide

to the business, and are starting to commit resources to purchasing/sourcing development. This development includes a shift in focus from cost cutting to profit generating with an increased concern for a new set of supplier performance measures, which confirms previous research on strategic sourcing in the textile and apparel industry (Su et al., 2009; Su and Gargeya, 2012a; Su, 2013). However, for small- and medium-sized firms in the US textile and apparel industry, this study found that formal supplier evaluation systems are not emphasized to a great extent. With the continuous changes in products, processes, and business, there should be changes in SMEs' supplier evaluation systems. From a manager's perspective, the observation that many small- and medium-sized firms still evaluate the suppliers informally, having no formal supplier certification program or no formal tracking system, represents a future opportunity for firms to improve by implementing or strengthening formal supplier evaluation systems. SMEs in the textile and apparel industry need to provide training to buyers to understand the importance of formal supplier evaluation systems and to allocate resources to develop supplier evaluation programs.

This research revealed that among the 24 supplier selection practices, on-time delivery, trust, product quality level, price/cost of product, quick response time, communication openness, and honest and frequent communication have been regarded the most important supplier selection criteria, while the strategic importance of suppliers, trade regulations, profitability of suppliers, presence of certification, business culture match, and geographical compatibility/proximity have been regarded the least most important supplier selection criteria. The majority of the supplier selection criteria have strong association with performance; while several supplier selection criteria show no strong relationship with performance. Consistent with previous literature, this study demonstrates that on-time delivery, quality level, quick response time, honest and frequent communication, and customer service not only are the criteria rated by the respondents as the top supplier selection criteria, but also are strongly related to firm performance. They were cited as the top competitive priorities for manufactures (Kannan and Tan, 2002; Tan, 2002; Su et al., 2009; Kotula et al., 2015).

The 24 supplier selection criteria reflect seven aspects of supply selection, addressing issues with regard to product quality, price/cost of product, supplier responsiveness, strategic consideration, supplier capability, relationship, and compatibility. Multiple regression analysis of firm performance and the seven aspects of supplier selection revealed that quality level and strategic consideration each significantly affected overall customer service levels and overall customer satisfaction. The managerial implication is that managers must invest to improve product quality and quality is the most significant contributor to firm performance, which is consistent with Kotula et al.'s (2015) finding that quality is the most critical success factor. Multiple regression results also indicate that practitioners should put strong emphasis on strategic consideration of supplier to buyer which is characterized by the supplier selection criteria based on the strategic importance of suppliers, presence of certification or other documentation, profitability of supplier, and trade regulations. The need to place more emphasis on strategic consideration of supplier to buyer requires buyers to change their mindset in supply management. Recognizing supplier's strategic importance to buyer and supplier profitability enables buying firms to integrate suppliers into the buying company's supply chain strategy. The importance of presence of certification or other documentation in strategic consideration is reflected by the fact that certification and testing/compliance documents will help buyers to make sure their products meet



quality requirements, comply with all relevant product safety standards and their suppliers satisfy certain social compliances.

The textile and apparel industry is global in nature, and therefore trade regulations are deemed to be crucial in strategic global sourcing (Gereffi, 1999; Abernathy et al., 2006). Understanding international textile and apparel trade regulations and keeping abreast of latest developments and changes in trade regulations allows US textile and apparel manufacturers to enter and compete more easily in the dynamic global marketplace. In the dynamic global textile and apparel business environment, the trade rules affect where production occurs, what can be produced, and to whom it may be shipped. International trade policies will impact global textile and apparel production, distribution, and consumption channels and may lead to global sourcing shifts (Gereffi, 1999; Su et al., 2005; Abernathy et al., 2006). It is critical that professionals in the textile and apparel field learn about and try to understand these trade rules and the changes in rules as they occur. Therefore, trade regulations and emerging international trade trends should be taken into consideration in buying firm's strategic global sourcing decision making.

It is also evident that a need exists for some firms to reassess their supplier management tactics. While there is support for a wide variety of tactics, the observation that those supplier selection criteria considered less important by the respondents have strong impact on performance represents an opportunity for sourcing professionals to strengthen in their future business strategy, indicating that firms need to commit resources to fully utilize those supplier criteria and sourcing capabilities for enhancing firm performance. Improving firm performance requires not only a buying firm's strategic commitment to improved supply chain performance, but also a corresponding commitment from its partners (Kannan and Tan, 2002).

Some practices may be more appropriate for small businesses considering the limited resources of small firms, while other practices may take time to develop and can be costly propositions. For example, reputation of suppliers, which was not rated very important but is strongly related to firm performance, could be a key attributes in selecting suppliers efficiently; business culture match between companies, which was rated second least important by the respondents among the 24 criteria but is strongly related to firm performance, could be used by SMEs to choose better suppliers that they can communicate with effectively, but it may take time to get a feeling of whether business cultures between two companies match.

While this research provides valuable insights into SMEs in the textile and apparel industry, at this point, it is important to acknowledge limitations of the study that may provide opportunities for future research. First, this study was based on the survey results of 63 SMEs, so the small sample size limits the generalizability of the study results. Future research in supplier selection should be done by using larger sample. Expanding the size of potential sources would provide richer and more reliable information about SMEs' supplier selection practices in global sourcing. Second, the study only focuses on SMEs in the US textile and apparel industry. More work is needed to further explore supplier selection practices and other supply management issues by including other industries/areas of SMEs and their perspectives. Third, in this study respondents were asked to indicate the importance of the supplier selection criteria using Likert scale. We need to realize that there is a key difference between what firms believe is important for their supplier selection and how they execute their strategic supplier evaluation and selection. Future

research could explore the issue of strategy misalignment by comparing firm's perception of importance of supplier selection criteria and the actual extent of use for practices they adopt.

Fourth, future research needs to be conducted by collecting longitudinal data to examine the changing focus of SCM as SMEs expand their scope and requirements; thus collecting data over a longer period of time would provide additional and new insights into SMEs' motivations for success in global sourcing. Fifth, future studies could also reveal other possible avenues for studying supplier selection and other supply management issues in greater detail using a qualitative research design. The in-depth interpretive approach such as case studies or interviews with some of the SMEs would provide a more holistic perspective and could be fruitful for exploring and discovering new dimensions as well as identifying the actual nature of supply management issues in firm's strategic global sourcing processes. Finally, future research could investigate if firm size affects the strategic supplier selection and supplier integration practices of manufacturers, and whether it could influence the nature of the relationships existing among strategic selection, supplier development, and firm performance.

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