

# **A Study on Influence of Supply Chain Strategies on Competitive Advantage of Textile Industry - An Integrated Model**

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## **ABSTRACT**

This research paper represents one of the first empirical efforts to explore the complex causal relationships within the textile supply chain of south India. The research focuses on the textile industry's supply Chain Collaboration, Business Process Orientation, Supply Chain Pressure and Competitive Advantage with special geographical reference to Erode, a major hub of textiles in Tamilnadu, South India. The need for this study had risen from various literature reviews and industry associations' demand by which the researcher had understood the importance of the study and its industry implications.

The study has adapted a descriptive design and the data were collected both from primary and secondary sources. A structured questionnaire was developed, validated and administered for the primary data. Valid and reliable measures of Supply chain strategies, mitigation of supply chain pressure and their impact on competitive advantage were studied. The instrument development process involved structured interviews, a pilot survey and a large –scale survey. The large scale survey yielded 235 responses from registered textile supply chain partners-cloth manufacturers, wholesalers and retailers who are the members of Erode cloth merchant association, the largest association textile traders in South India. Exact statistical methods were used to asses and validate the constructs. The methods were: reliability, and structural equation modeling. An integrated model was developed and tested using structural equation methodology. The research findings support the notion that higher levels of Supply chain strategies will lead to improved Competitive advantage and mitigate the supply chain pressure. The strategies studied with reference to textile industry are supply chain collaboration and business process orientation. A SEM model with R2 value 0.407 is derived.

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## **Supply Chain Management in The Indian Textile Industry**

The textile industry products are unique, dynamic and cyclical but the degree of supply chain is fragmented due to new products, people, process and systems (Velayutham 2010). The Textile Industry is characterized by a complex production network, which spans many businesses and usually crosses international boundaries. There are various products in the textile field that spans from apparels to industrial fabrics like protective textiles, composite textiles, medical textiles and

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automotives, aerospace and in so many areas. With the growing demands of material and that of business, the Supply chain management has taken an important role throughout the world. It has taken its own shape in the textile industries where large quantities are in demand with varieties of product range.

Supply chain management is the supporting tool for efficient business processes and all industries have started adapting supply chain management to compete globally. Global textile contributors like the U.S, China, Hong Kong, Bangladesh, Pakistan, Turkey and India have started adapting supply chain strategies to sustain competitive advantage. Attaining competitive textile and apparel supply chain network needs innovation, efficiency, flexibility and high quality as their strong strategic approaches (Thatte et al 2013). The diversity of activities, the fragmentation of the market and the varying product and quality prevailing in the textile and apparel supply chain reflects the intricate nature of the industry. Since the sales are highly volatile and seasonal to fulfill the customer requirements, every business house needs good capacity planning, production scheduling, process control and inventory management. To make an integrated solution, companies work for stock balancing, inventory management, production planning and distribution scheduling, supply Chain and the management needs to be more systematic. Many research studies were focused on the strategies of supply chain management, that is, supplier selection, supply chain collaboration, buyer-supplier relationship, customer relationship and business process orientation. In this research paper, the textile Supply chain management is viewed from the Tex-valley where there are only few studies on enhancing competitive advantage through strategies.

India is one of the world's fastest growing economies with diverse markets. Textile supply chain is the second largest supply chain in the Indian sub-continent and this chain employs 38 million people and contributes directly 4% to the nation's GDP (Ashok Desai 2012; Bhandari & Ray 2012). Indian textile industry is better known through the clusters operating in 18 different locations. India is one of the largest markets for textile produce and also contributes to world exports in textiles, next to China in the export market. Since there is a complex network and it comprises of major unorganized sector, the need for efficient supply chain management is felt. An effective adoption of supply chain practices is realized as one of the ways to gain or sustain the competitive advantage. The key dimensions of a company's business strategy are the objectives, processes and management-focus that enable achieving competitiveness by alignment of the supply chain strategy with the business strategy. Indian industries require an enhanced level of competitiveness to manage the business strategy with supply chain strategy. The aspects tried in the research are to improve the competitiveness of the vital textile cluster whose contribution to the nation's textile industry is a remarkable one.

## **Identification of Research GAP**

Very few researches have been done in India focusing on the impact of Supply Chain Strategies on Competitive advantage and Supply Chain pressure. Numerous studies in the developed markets like U.S and Europe emphasizes the importance of integrating suppliers, manufacturers and customers through effective supply chain management so as to attain competitive advantage. Most of the studies

are on the organized sectors of garment suppliers and retailers. These studies did not cover the initial partners in the textile supply chain like the cloth manufacturers, wholesalers and retailers who fall under the unorganized sector. This has left a gap upon the studies done in supply chain partners of textile industry in India. Some studies have focused only on specific strategic performance issues of firms and there has seldom been any research aimed at building and validating theoretical models of supply chain management in India. This has left the following research questions unanswered

1. Do the textile firms follow efficient supply chain practices?
2. Are the supply chain practices relevant to the advantage of textile firms?
3. Are the textile supply chain partners aware of strategies adopted in supply chain management?
4. Is there any role of supply chain uncertainty observed by the textile supply chain partners?
5. Will the Competitive advantage and profits be enhanced through supply chain strategies in the textile industry?

This research paper aims at answering all the above questions and proposes an integrated supply chain model for the Textile industry in South India. It is understood that achieving competitive advantage is the most desired status for any partner in textile supply chain. Thus the concept "Competitive Advantage" has severed as the dependent variable of this research study. The research addresses on the scope and activities associated with supply chain strategies and competitive advantage, the importance of uncertainty in supply chain, the difference among the supply chain partners in understanding the elements of competitive advantage and supply chain strategies.

### **Importance of The Study**

India, being the Second largest country in Asia, textile manufacturing and exports is an important source of revenue to the economy. India earns around 27% of the foreign exchange from exports of textiles and contributes about 4% to Nation's GDP (Swamynathan & Ravindran 2009). In that market of 1300 millions of customers and highly complex market systems, this textile industry is the bread winner of 38 million Indians. The chain is fragmented due to new products, people, process and systems (Pankaj Chandra 2006). To remain competitive, the Indian textile industry had started reconstructing its cost components and productivity concepts with technologies and increased productivity targets and the competition has changed towards quality, flexibility, product variety, timely deliveries than low cost. The research focuses on efficient strategies to improve the competitive advantage in the Textile industry. The study is conducted in Tamil Nadu's major textile cluster-Erode a well known textile-hub in the country. The time period of the study is July 2010- March 2013. This period represents a tough competition, change in textile export policy and impact of Government regulations with specific to Environmental concerns in the country (Verma 2002). Because this study considers the important supply chain partners - cloth manufacturers, wholesalers and retailers, this time period is considered appropriate to conduct research. The target respondents are expected to have membership in the Erode Cloth Merchants Association, which is the largest association of textile traders in the state with registered membership of 1200 firms in the textile industry.

The population of the study is the members of Erode Cloth Merchants Association, who are engaged in the business of textile manufacturing, wholesale trading and retailing. The geographical sample frame is selected to be Erode, Tamil Nadu which forms the largest textile hub in South India. Tamil Nadu has remarkable role in the nation's textile sector. Tamil Nadu owns distinct textile clusters where out of 1875 large and medium textile mills in India 858 are here. The State holds 47 % of total spinning output of the nation and accounts for more than 40 % yarn exports from the country. Erode (Tex-city or Loom-city of India) as a stand –alone hub alone contributes to 76 % of India's textile market both to domestic consumption as well to exports (Marimuthu & Mary Jessica et al 2012) (Govt. of India, 2012) and the establishment of Tex- valley adds more importance and opportunities. This research focuses towards Tamil Nadu's textile supply chain and the sample frame chosen is Erode. All selected respondents are the textile supply chain partners, who are registered members of the most popular Textile association, ECMA. The geographical sample frame is constituted from Erode, the "textile hub" where all the activities from spinning, weaving, processing, fabric manufacturing, trading occurs (Palanisamy & Kavitha 2010). There are 28 textile associations in Erode, among which Erode cloth merchants association is the oldest and largest association, for the past 53 years with more than 1200 registered members from the industry. The respondents are selected on random from the ECMA members and the data were collected through interviews. Prior to data collection, the questionnaire was validated with help of industry experts. A total of 300 respondents that is 25% of the ECMA members were selected for the research study. Out of 300 respondents, only 235 questionnaires were complete which is consistent to analyze.

## **Objective**

To understand the influence of supply chain strategies upon competitive advantage in the textile industry with an integrated model.

## **Factors of Supply Chain Strategies Influencing Competitive Advantage of Textile Supply Chain Partners**

In the textile supply chain the competitive advantage (CA) of the partners is influenced by strategies like supply chain collaboration (SCC) and business process orientation (BPO). Supply chain pressure (MOP), simultaneously mitigates the competitive advantage. The following strategies are derived from the literature review:

- (1) Supply chain collaboration which is measured by the indicators-
  - (i) Top management commitment
  - (ii) long- term relationship
  - (iii) Trust
  - (iv) information sharing and
  - (v) risk & reward sharing
- (2) Business process orientation measured by the indicators-
  - (i) process measurement and management
  - (ii) process job and
  - (iii) process view.

The above constructs influence a firm's competitive advantage.

In textiles, supply chain networks are complex and generally in the unorganized sector. In spite of this, their contribution to the nation's GDP is remarkable (Manoj Vaish & Rajesh Dubey 2012). It is therefore, essential to understand the influence of supply chain strategies vis-à-vis the competitive advantage amongst the supply chain partners. The supply chain pressure is due to reduced availability of skilled, qualified labor, existing market competition and competitive pricing and which firms have to mitigate to compete. Thus, the influence of such mitigation of supply chain pressure on the competitive advantage also needs to be studied as a construct in addition to SCC and BPO vis-à-vis CA.

In this research paper, structural equation modeling (SEM) has been used to empirically test the strategies influencing competitive advantage among the supply chain partners of the textile industry. Structural Equation Modeling is not a single statistical technique; instead it refers to a group of related tests. The first step of PLS Path modeling starts with the test of reliability and, unidimensionality assessment has been performed. Constructs validity tests are performed to prove unidimensionality. PLS method examines the convergent validity by referring Average Variance Extracted (AVE) values which can be obtained by performing confirmatory factor analysis and, the proposed interrelationships of the construct being studied and path analysis has been performed. A commonly assumed significance level is a two tailed 5% significance level that is indicated by  $t=2.00$ . If the computed value of t-statistic happens to be higher than the cut off value then it implies the path being considered is significant.

Chin (1995), found Bootstrap to be more reliable in estimating the significance of path. Hence this research has used bootstrap for the purpose of determining causal relations proposed in the model. In the bootstrap used in this research, random samples comprising 235 respondents were taken and 500 re-sample were taken into consideration (to get the best estimates a re-sample number of 500 is recommended although in theory an infinite resample is needed for the purpose). The results were examined for significance. At 5% level of significance the cut off value t-statistic is 2.00. In general we assume that if the t-statistic is more than two, the path is significant.

## Reliability of Constructs

Reliability of constructs refers to the accuracy with which the construct repeatedly measure the same phenomenon without much variation (Cronbach 1951). The research instrument's reliability and validity is important to maintain the rigorousness of research. The reliability of each construct is examined using Cronbach's alpha, the most common measure of scale reliability (O'Leary Kelly & Vokurka 1998). For the acceptance of a construct an alpha score larger than 0.7 is required (Nunnally 1978).

**Table 1 : Reliability of Constructs**

SI.No.	Constructs	Alpha value
1	Supply chain collaboration	0.758
2	Business process orientation	0.802
3	Mitigation of Supply chain pressure	0.823
4	Competitive advantage	0.912

## Convergent Validity

The convergent validity is used to indicate the degree of association among the measures or indicators of a construct. The AVE value of greater than 0.5 indicates good convergent validity which can be found out through confirmatory factor analysis.

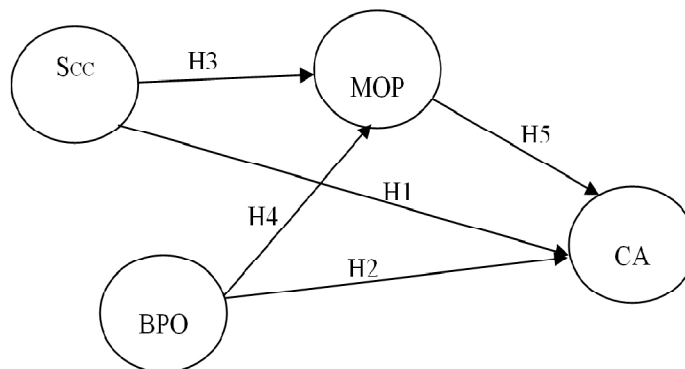
**Table 2 : Convergent Validity**

Sl.no.	Constructs	AVE values
1.	Supply chain collaboration	0.735951
2.	Business process orientation	0.671472
3.	Mitigation of supply chain pressure	0.624336
4.	Competitive advantage	0.719715

The AVE values are shown in Table 5.4 for all the constructs. Since AVE values for all the constructs exceed 0.5 it can be assumed that convergent validity is supported for all the constructs.

## Causal Model and Hypothesis Testing Results

To verify the influence of supply chain strategies on competitive advantage, the following hypotheses with their inter-relationships were proposed and represented as a research model.



**Figure 1 : The Proposed Structural Equation Model**

The following hypotheses were proposed and tested against the model

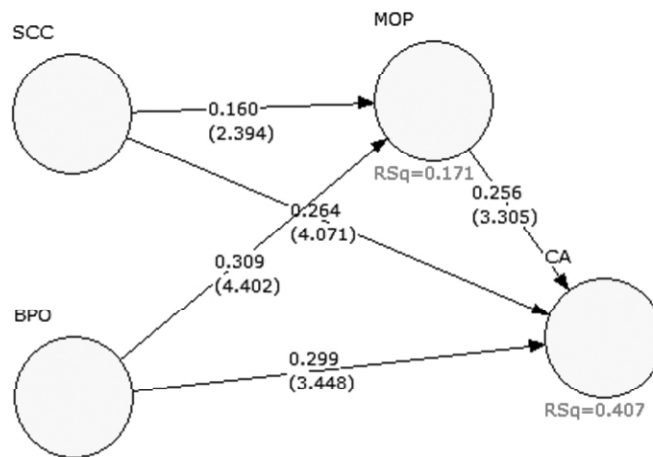
- H1 There is positive relationship between supply chain collaboration (SCC) and competitive advantage (CA).
- H2 There is positive relationship between business process orientation (BPO) and competitive advantage (CA).
- H3 There is positive relationship between supply chain collaboration (SCC) mitigation of the supply chain pressure (MOP).

- H4 There is positive relationship between of business process orientation (BPO) and mitigation of the supply chain pressure (MOP).
- H5 There is positive relationship between mitigation of supply chain pressure (MOP) and the competitive advantage (CA)

**Model Validation and Discussion of Results**

A comprehensive model has been proposed in the research to measure the relationship between competitive advantage (dependent variable) and the supply chain management strategies (independent variables) with mitigation of supply chain pressure as the intervening variable and has been validated using PLS path modeling technique of Structural equation modeling (SEM).

The PLS path modeling has been done to run the model. The data of 235 respondents were input and the output model is shown in Figure 2.



**Figure 2 : Research Model Validations**

**Table 3 : Structural Model -Bootstrap**

	Entire sample estimate	Mean of subsamples	Std error	t-statistic	Results
SCC-CA	0.2640	0.2813	0.0643	4.0711	Significant
BPO-CA	0.2990	0.2983	0.0867	3.4484	Significant
BPO-MOP	0.3090	0.3207	0.0702	4.4015	Significant
SCC-MOP	0.1600	0.1678	0.0668	2.3944	Significant
MOP-CA	0.2560	0.2540	0.0775	3.3051	Significant

## **H1 There is positive relationship between supply chain collaboration (SCC) and competitive advantage (CA).**

The relationship between supply chain collaboration and competitive advantage is highly significant (beta= 0.264, t-statistic=4.071). This establishes the fact that supply chain collaboration contributes to competitive advantage of the textile industry. The one level of increase in supply chain collaboration results in 2.6 time increase of competitive advantage. The Supply chain collaboration refers to the collaboration between the supplier and the buyer in terms of information sharing, Trust, long term relationship, Top management commitment and Reward sharing. Supply chain collaboration is found to be significantly associated with business performance. In the garments and the textiles industry, which fall under make- to- order production systems; as such, interaction with the customers as early as the product design and demand planning is critical. Collaboration with suppliers is very important to ensure the right quality and quality of materials in time for the production schedules (Talavera & Gloria 2009). Spina & Zotter (2001) stated the high incidence of collaborative activities in industries characterized by high volumes, complex products, and high cost of inventories. The findings of their study support the fact that collaborative activities improve the innovativeness. The firms in the collaborated supply chains have greater competitive advantage than those in less collaborative supply chain (Themistocleous et al 2004). Small firms were equally responsive to better the supply chain practices like the large firms in the industry across the globe. Henceforth, the results confirm and highlight that supply chain collaboration enhances competitive advantage, in the textile industry.

## **H2 There is positive relationship between business process orientation (BPO) and competitive advantage (CA).**

The relationship between business process orientation and competitive advantage was found to be highly significant (beta=0.299 t-statistic= 3.448). The above results confirms that higher the level of business process orientation higher level will be the competitive advantage. The one level of increase in business process orientation results in 2.9 increases of competitive advantage. The key elements of business process orientation are process management and measurement, process view and process job. These first order constructs are considered for model development with their impact on competitive advantage. These elements play a vital role in every business and based on the literature support for the above, hypothesis were developed. BPO being an important strategy helps every business to orient their activities from plan, make, source and deliver. It enables any manufacturing firm to achieve process maturity and next level of adoption of maturity model & SCOR model. These facts are studied in Bangladesh garment industry and Bangalore ready-made sector (Mohammad ali & Mamun Habib 2012). The level of process management and measurement significantly influences the level of business performance. Process jobs are organizational jobs understood in terms of business processes that recognize the process owners who are responsible for them (Skrinjar et al 2010; McCormack 2001; Davenport 1993; McCormack & Johnson 2001). Being the unorganized market the major supply chain partners are practicing Business process orientation which increases the competitive advantage. The original model of Business Process Orientation was developed by McCormack (2001) to examine its impact on performance through interdepartmental connectedness



and conflict. The literature indicates the positive impact of BPO on competitive advantage (Fitzgerald & Murphy 1996). The researcher applied the BPO as an important strategy on textile supply chain partners, to observe the improvement in business performance.

In the textile industry the supply chain partners are relatively practicing PV, PJ, & PMM. It deals with cycle time, process cost, and maintenance of bills receivable & payable, accounts and labor and overheads that happens in the business. They also reveal the dealing on business focus, organizational structure, owner's involvement and customer participation which are the important practical aspects of a textile business. Most of the Indian manufacturing clusters are geographically concentrated and more of community oriented business houses, outsourcing happen at a large scale. Any industry where outsourcing dominates in the business then the BPO significantly contributes to the competitive advantage. The result shows that the textile supply chain partners adopt the BPO elements that have positive influence on their competitive advantage.

### **H3 There is positive relationship between supply chain collaboration (SCC) and mitigation of the supply chain pressure (MOP).**

The relationship between supply chain collaboration and mitigation of supply chain pressure was found to be significant (beta= 0.160 t statistic= 2.394). The supply chain pressure is the result of unavailability of labor, market competition, and lack of skilled labor, lack of technical knowledge and price of competitors. The finding empirically confirms the assertion in the literature study on retailers, it is proved that the value of coordinating supplier activities, true collaboration and seamless integration of key business functions have only recently begun to emerge through supply chain management (Brown et al 2005; Ganesan et al 2009). In many instances, traditional, adversarial relationships have been replaced by closer, more collaborative relationships. The results supports the fact that good collaboration between the buyer and supplier in terms of long term relationship, trust, information sharing helps to mitigate the pressure existing in the supply chain. It is also logical that when there is high level of collaboration then the mitigation of the pressure is possible. For managers this implies that being operationally collaborative will, enable firms to mitigate the issues relating to labor, and improve the firm's ability to provide on time the type and volume of product required by customers and to compete in the market. Collaboration of a firm's supplier network will improve the ability of the firm to rapidly introduce technology features in the market place (i.e. competition based on product innovation and time to market), as well as improve a firm's ability to provide on time delivery. The result reinforces the theory and confirms that mitigation of supply chain pressure is possible through supply chain collaboration.

### **H4 There is positive relationship between business process orientation (BPO) and mitigation of the supply chain pressure (MOP).**

The relationship between business process orientation and mitigation of supply chain pressure significant (beta= 0.309 t-statistic=4.402). Every business adopts business process orientation which focuses on process management and measurement, process job, process view which certainly mitigates the supply chain pressure. All the indicator of BPO encompasses the complete process

orientation in a firm associated with the process-based allocation of resources that ensures mitigation of supply chain pressure (McCormack & Johnson 2001). The effectiveness of business process orientation helps to create innovation in key processes and it envisions the new work strategies in the organization (Davenport 1993). The success of business process orientation depends on process teams' innovative and creative abilities (Harrington 1995) that paves to mitigate the pressure due to competitor price. Business process orientation introduces process-based structural change into an organization, which in turn leads to creative ways of achieving organizational objectives (Harrington 1995). The efficient management of business processes is vital in a dynamic and competitive environment. Business process orientation and management foster a process culture based on innovation and performance (Prakash & Damien 2009). The literature indicates the positive impact of business process orientation on mitigation of pressure that enhances organizational performance (Fitzgerald & Murphy 1996; Kaplan & Norton 1996; McCormack & Johnson 2001; Skrinjar et al 2008). Business process orientation helps to improve both the financial and the non-financial performance of an organization (Skrinjar et al 2008). Investment in business processes creates competitive advantage for the organization and brings about significant improvements to the system (Adel Azar & Karim Bayat 2013; Zaheer 2010;) Business process orientation focuses on the efficient transformation of input into output to meet customer requirements. In this way, it helps to achieve overall organizational goals by attaining efficiency as well as efficacy (Fitzgerald & Murphy 1996; Mackay et al 2008). Skrinjar et al (2008) examined the relationship between business process orientation and non-financial performance measures such as employee satisfaction, learning, commitment, absenteeism and working conditions. The result is consistent with previous literatures and thus the hypothesis is accepted.

#### **H5 There is positive relationship between mitigation of supply chain pressure (MOP) and the competitive advantage (CA).**

The relationship between mitigation of supply chain pressure and the competitive advantage is significant (beta= 0.256 t statistic= 3.305). The fact observed is, that mitigation of pressure has positive influence on competitive advantage that is measured in terms of cost, differentiation and focus advantages. The mitigation of pressure results in increase in the competitive advantage among the supply chain partners of textile industry. The study reveals the fact that it is essential to mitigate the pressure caused due to unavailability of labor, lack of skilled labor, lack of technical knowledge, market competition and competitor price. The results confirm the literatures that, competitive advantage is achieved through reasonable cost, product innovation, delivery time and with capability of introducing new products and features in the market place quickly; an integrated (seamless) supply chain will enable organizations to compete based on time, cost/price, and delivery dependability; A supply chain characterized by quick responsiveness to customers and superior supplier performance will be competitive in terms of time and quality; and a high-quality partnership means that the outcome of partnership matches the expectation of participating organizations, which will be further reflected in multiple competitive measures such as price/cost, quality, time to market and product innovation. Frohlich & Westbrook (2001) find that the greatest degree of integration with both suppliers and customers had the strongest association with performance improvement, including cost, time, and

speed of product development and delivery dependability. Tracey et al (1999) find significant correlation between supplier performance and such measures as cost, quality, delivery, and inventory. Confirming the finding of Li et al (2006) that SCM practices directly and positively impact competitive advantage, asserting the argument that implementation of various SCM practices, such as supply chain collaboration, business process orientation may provide the firm a competitive advantage on cost, quality, delivery dependability, time to market, and product innovation and also mitigate the pressure. Hence, the findings are strongly supported with the previous literature.

## Summary of Results

The main aim of this study is to identify the supply chain strategies and their impact on competitive advantage and the mitigation of the supply chain pressure through the adoption of strategies. The proposed supply chain strategies model along with mitigation of supply chain pressure provides a good understanding about the factors that influence competitive advantage of the supply chain partners in the Textile industry. The model accounts for 40.7% of the variance of the intention variable. The results are partially in line with the findings of other researches in supply chain management (ByoungHo, 2004) (Adel azer & Karim Bayat2013). Globalization has forced manufacturing and trading firms to adopt good supply chain practices to survive and remain competitive.

The research indicates that the firms are consciously monitoring the business environment and are sensitive to changes in a positive way. Supply chain strategies are the keys to sustain competitive advantage in small firms. Mitigation of supply chain pressure has been a contributing variable to competitive advantage across textile firms.

The findings reveal that effective Supply chain collaboration; business process orientation will facilitate mitigation of supply chain pressure. Since the  $R^2 = 0.407$  and all the regression co-efficient were significant at 5% level, the model has a high fit. It is clear that SCC and BPO among the supply chain partner have direct relationship with competitive advantage.

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