A Study of Level of Selected Dimensions in Supply chain management (SCM) Activities in Textile Industries

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Abstract **-** The Indian textile industry is one the largest and oldest sectors in the country and among the most important in the economy in terms of output, investment and employment. The sector employs nearly 35 million people and after agriculture, is the second-highest employer in the country. With direct linkages to the rural economy and the agriculture sector, it has been estimated that one of every six households in the country depends on this sector, either directly or indirectly, for its livelihood. The Ministry of Textiles is responsible for policy formulation, planning, development, export promotions and trade regulation in the textile sector. This includes all natural and manmade cellulosic fiber used to make textiles, clothing, and handicrafts.

SCM is an effort to integrate the supply chain from raw material suppliers to end- use consumers with a streamlined information and material flow by collaboration between supply chain members to maximize the consumer satisfaction while maintaining the minimum operation cost. Many researchers and academics have identified necessary activities, conditions, and barriers to implement SCM. Six dimensions of SCM have been emphasized repeatedly in the literature. Those six dimensions are collaborative partnership, information technology, operation flexibility, performance measurement, top management's commitment and leadership, and demand characterization. Each dimension requires several key activities. This finding implies that the Textile industry, especially for Textile manufacturers, might be a more difficult industry in which to implement SCM activities, unlike other industries here standardized products are prevalent.

Keywords: Information technology, operation flexibility, Performance measurement, Supply chain management, Textile

I. INTRODUCTION

The phrase "Supply Chain Management" was originally coined by Keith Oliver in 1982 and subsequently gained increasing popularity as its usage was proliferated in books and language. SCM involving most and every aspect of any types business in world. It is an umbrella term which encompasses the end-to-end aspects of Finance, Operations, Development, Sales, Manufacturing, Distribution, Customer Management, Supplier Management, Technology and I/T. Supply chain management consists of developing a strategy to organize, control, and motivate the resources involved in the flow of services and materials within the supply chain. A supply chain strategy is an essential aspect of supply chain management, seeks to design a firm's supply chain to meet the competitive priorities of the firm's operations strategy. In other words, Supply chain is an integration of all value-creating elements from raw material extraction to the end of consumption by end user. Supply chain and value chain are sometimes used interchangeably.

Supply Chain Management concept has been widely accepted and practice in the daily operations by the major companies since the early 1990s. During the 1980s and 1990s, most of the giant companies, which are consider as multinational companies have started to implement supply chain concept in their daily operation . According to Rhonda (1999), more and more companies especially multinational company (MNC) has started the integration of Supply Chain Management in their job environment. However, some of them were not getting the expected results. Most of them are focus on wrong factors and not clearly understand the meaning of supply chain.

Supply Chain Management seeks to synchronize a firm's processes and those of its suppliers to match the flow of materials, services, and information with customer demand (Lee J. Krajewski & Larry P.Ritzman, 2001). Thus there are two main players in the supply chain activities, which are suppliers and customers. Furthermore, in this challenging era, firms may have to fight for the lower cost with the

best quality and efficiency, and also higher customer satisfaction especially for those Multinational Companies.

Supply chain management (SCM) by researchers is viewed in materials, information, and finances. SCM in textile industry consists of a lot of procedures, suppliers, middleman and customers. The SCM is a process that moved from supplier to manufacturer to wholesaler to retailer to consumer. SCM involves the various levels of flows for coordinating and integrating inter and intra in companies. The objectives of effective SCM is to make products available when it need arise. Supply chain management flows can be divided into three main flows

1. Product flow: includes the movement of textiles from a supplier to a customer, as well as any customer returns or service needs.
2. Information flow: involves transmitting orders and updating the status of delivery.
3. Financial flow: It consists of credit terms, payment schedules, and consignment arrangements.

There are four major decision areas in textile supply chain management: 1) location, 2) production, 3) inventory, and 4) transportation (distribution), and there are both strategic and operational elements in each of these decision areas.

Lee J. Krajewski & Lam- P Ritzman. (2001) summarized the main members of SCM into four which contributes to the successfulness of the Supply Chain Management. They are suppliers, manufacturer, distribution center and customer. It shows that the interconnected set of linkages between suppliers of materials and services that spans the transformation of raw material into products or services and deliver to a firm's customers is known Supply Chain.

The importance of supply chain management (SCM) and information technology are increased day by day. As information technology evolves, firms tend to become more integrated. Therefore, it is important for improving performance of supply chain that there should be effective supply chain integration with effective information sharing (Zhou and Benton, 2007). Partnership between firms is an increasingly essential for finding and maintaining competitive advantage. This could be achieved by extensive social, technical, service, and economic ties in due course (Mentzer et al., 2000).

Under the traditional supply chain approach, Textile companies at each node in the supply chain build inventories in the form of raw materials, Work-In-Process (WIP), and finished goods. Textile manufacturers react very slowly to new demand trends because they build similar levels of inventory for volatile and non-volatile items and the manufacturing system does not keep pace with the movement of fastest selling items (Sabath, 1998).

For manufacturers to satisfy their customers while using current facilities and capabilities, they will need to continue with the high level of inventory in some form. Manufacturers' strategy to build high levels of inventory reduces efficiency of SCM throughout the pipeline. Most models used in other manufacturing industries have not been appropriately used in the Textile industry because the inherent assumptions for the models do not reflect well the volatile and uncertain world of fashion products (Bhat, 1985). In the recent past its relised that to have a competitive advantage its required to have a relationship between the supply chains and the formation of a specialized management theory. The relationship between SCN processes is illustrated in the figure 1. below. [The bidding, supplier management and order fulfillment cycles in SCN (Tan, Gek Woo, Shaw, Michael J. and Fulkerson, Bill ,2000)]

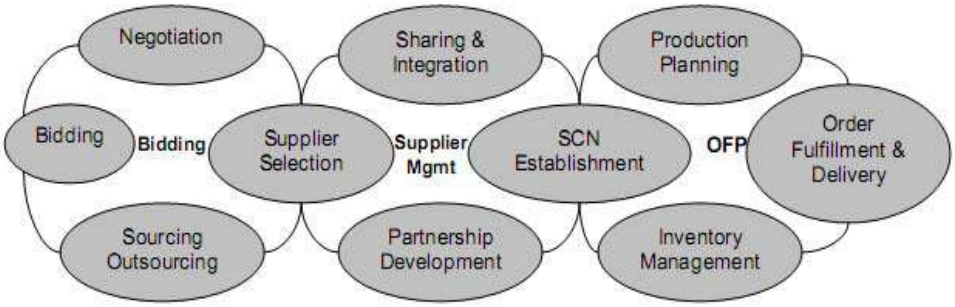

Figure 1: The relationship between SCN processes

Supply Chain management as a management philosophy takes a system approach to viewing the supply chain as a single entity. This means that the partnership concept is extended into a multi firm effort to manage the flow of goods from suppliers to the ultimate customer. Each firm in the supply chain

directly or indirectly affects the performance of the other supply chain members, as well as the overall performance of the supply chain (Cooper, et al 1997, p.5)

Supply chain management is often taken for granted in the business world. Regardless of industry, the supply chain is the backbone of any company. It begins with procuring the materials or services needed to create the end product and continues until the finished goods are in the customer's hands. This process typically involves a range of decisions and transactions between several distinct entities.

II. OBJECTIVE & HYPOTHESIS

The Levels of activities in SCM are high level strategic decisions concerning the whole organization, such as the size and location of manufacturing sites, partnerships with suppliers, products to be manufactured and sales markets. Tactical decisions focus on adopting measures that will produce cost benefits such as using industry best practices, developing a purchasing strategy with favored suppliers, working with logistics companies to develop cost effect transportation and developing warehouse strategies to reduce the cost of storing inventory. Affect how the products move along the supply chain. Operational decisions involve making schedule changes to production, purchasing agreements with suppliers, taking orders from customers and moving products in the warehouse.The objective of this paper is to study and identify the selected level of SCM activities of Textile manufacturers.

The following hypothesis was formulated to analyse the level of SCM activities in textile manufacturing activities. The Null Hypothesis: $H_o.1$. The Implementation stages of Supply Chain Management activities among textile manufacturers are not different. The Alternative Hypothesis: H1.1. The implementation stages of Supply Chain Management activities among textile manufacturers are different.

III. METHOD

The focus of this research is to study the relationship between SCM activities and other textile manufacturing activities. The SCM activities are defined into six dimensions. Those six dimensions are partnership, information technology, operation flexibility, performance measurement, management commitment and leadership, and demand characterization. Each dimension consists of four to six activity items identified and conceptualised through literature analysis.

The questionnaire was prepared based on the studies by Prajogo et al. (2012). This questionnaire was sent by e-mail to the responsible staff of supplier management area. Questionnaires were mailed to a stratified random sample. The respondents were asked to evaluate each questions considering a Likert scale from 1 to 5, in which 5 means "completely agree" and 1 means "completely disagree", relating to the application of SRM practices

The sample collected is not probabilistic because not all the elements of the researched population have the same chance of being selected. This happened because the research answers were obtained from the companies that were willing to answer them, and executed by professionals who work in the supplier management of the companies

IV. LITERATURE REVIEW

Over the past decade, there has been an increasing emphasis on supply chain management as a vehicle through which firms can achieve competitive advantage in markets (Collin, 2003, p. 8). A large number of examples in the 1990s show how companies have made large investments to streamline their supply chains in order to improve customer satisfaction and increase their internal productivity. As Christopher (1998, p.130) states, it is not actually individual companies that compete with each other nowadays; rather, the competition is between rival supply chains. The supply chains that add the most value for customers with the lowest cost in the chain make up the winning network of individual companies. The Supply Chain council (1997) used the definition: "The supply chain – a term increasingly used by logistics presentations – encompasses every effort involved in producing and delivering final products, from the suppliers' supplier to the customers' customer. Four basic processes – plan, source, make, deliver – broadly define these efforts, which include managing supply and demand, sourcing raw materials and parts, manufacturing and assembly, warehousing and inventory tracking, order entry and order management, distribution across all channels, and delivery to the customer." Quinn (1997) defines the supply chain as "all of those activities associated with moving goods from the raw-materials stage through to the end user. This includes sourcing and procurement, production scheduling, order processing, inventory management, transportation, warehousing, and customer service. Importantly, it also embodies the information systems so necessary to monitor all of those activities."

The following eight key supply chain management processes are included in the framework (Cooper, 1997, p. 1-14):

1] Customer Relationship Management.
2] Customer Service Management.
3] Demand Management.
4] Order Fulfilment.
5] Manufacturing Flow Management.
6] Supplier Relationship Management.
7] Product Development and Commercialisation.
8] Returns Management.

The eight key business processes run along the supply chain and cut across firms and functional silos within each firm. Although functional expertise remains in place, implementing supply chain management requires making a transition from a functional organization to one focused on business processes, first within a company and then across the companies in a supply chain. While management teams of all firms in each supply chain should consider these eight processes, the relative importance of each process and the specific activities included may vary.

The Supply Chain Council developed another framework called Supply-Chain Operations Reference-model (SCOR). This process model is designed for effective communication among supply-chain partners. The scope of the SCOR model is defined as "From company's supplier's supplier to company's customer's customer" (Supply Chain Council, 2005).

According to Cohen (2004), effective supply chain processes in the company should:

1] Fit to supply chain strategy and support the basis of competition.
2] Ensure end-to-end management, by having the same vision and set of shared objectives.
3] Be simple, easy to understand, to reduce complexity, which adds to cost and decreases manageability.
4] Have an adequate level of integrity in terms of integrated applications, accurate data, and documented processes.

The company must pick the state of the art practices and processes that really fit the strategy to improve the basis of competition and avoid the trap of choosing costly cutting edge practices that provide only marginal support

India's textiles industry contributed seven per cent of the industry output (in value terms) in FY19. It contributed two per cent to the GDP of India and employed more than 45 million people in FY19. The sector contributed 15 per cent to India's export earnings in FY19. Textiles industry has around 4.5 crore employed workers including 35.22 lakh handloom workers across the country. The domestic textiles and apparel market stood at an estimated US$ 100 billion in FY19. The textiles sector has witnessed a spurt in investment during the last five years. The industry (including dyed and printed) attracted Foreign Direct Investment (FDI) worth US$ 3.44 billion from April 2000 to March 2020. (https://www.ibef.org/industry/textiles.aspx).

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According to the WTO, the value of the world textiles (SITC 65) and apparel (SITC 84) exports totaled $305bn and $492bn in 2019, respectively, decreased by 2.4% and 0.4% from a year ago. The world merchandise trade also fell by nearly 3% measured by value and 0.1% measured by volume 2018-2019, in contrast with a positive 2.8% growth 2017-2018.

A simple Supply Chain Model (Figure 2) proposed by Beamon in 1998 identifies two basic, integrated processes: 'production planning and inventory control process', and the 'distribution and logistics process'.

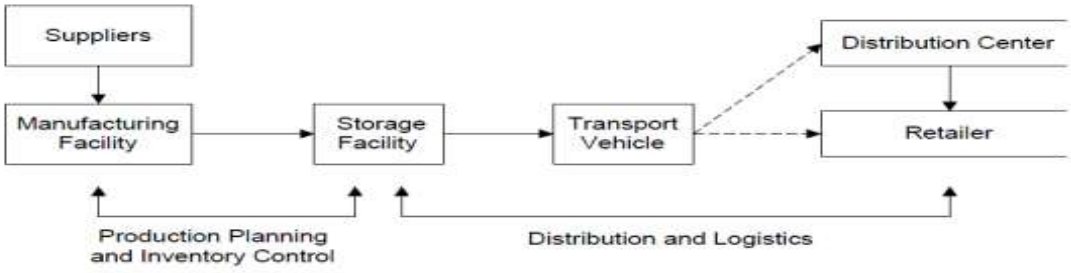


Figure 2- : The Supply Chain Process (Source: Beamon, 1998)

SCM is an effort to integrate the supply chain from raw material suppliers to end- use consumers with a streamlined information and material flow by collaboration between supply chain members to maximize the consumer satisfaction while maintaining the minimum operation cost. Many researchers and academics have identified necessary activities, conditions, and barriers to implement SCM. Six dimensions of SCM have been emphasized repeatedly in the literature. Those six dimensions are collaborative partnership, information technology, operation flexibility, performance measurement, top management's commitment and leadership, and demand characterization. Each dimension requires several key activities.

Supply Chain Management (SCM) system is an integrated and collaborative network of suppliers, factories, warehouses, distribution centres, and retailers, through which the whole chain of logistic process is managed for a fast & flexible coordination between a company, its customers and suppliers with the chain. Among the members of supply chain collaboration, which is based on sharing sense-like information sharing, resource sharing, risk sharing and activity sharing- plays a critical role to implement an effective SCM. So, an increasing number of companies subscribe to the idea that developing long-term collaboration, cooperation and partnership, can take significant wastes out of supply chain

The supply chain realizes lean inventory management with efficient SCM. Mathematical methods to control the level of inventory, especially to determine the quantity and timing of the reorder, have been studied and applied to many industries. Whether these methods are effectively used by the textile industry is not clear due to the abnormally extended length of the chain and traditional business practices between chain members. SCM is not a completely new concept to the textile industry because QR in the textile industry is one aspect of SCM. Although the QR is being actively implemented by the textile industry and has resulted in many desirable benefits, textile manufacturers are still struggling with inventory management because of uncertainty in the chain from suppliers, manufacturing, and demand

Top Ten Benefits, Barriers, and Bridges to Supply Chain Management

Benefits	Barriers	Bridges
▪ Increased customer responsiveness ▪ More consistent on-time delivery ▪ Shorter order fulfillment lead times ▪ Reduced inventory costs ▪ Better asset utilization ▪ Lower costs of purchased items ▪ Higher product quality ▪ Ability to handle unexpected events ▪ Faster product innovation ▪ Preferred & tailored relationships	▪ Inadequate information sharing ▪ Poor/conflicting measurement ▪ Inconsistent operating goals ▪ Organizational culture & structure ▪ Resistance to change – lack of trust ▪ Poor alliance management practices ▪ Lack of SC vision (understanding) ▪ Lack of managerial commitment ▪ Constrained resources ▪ No employee passion/ empowerment	▪ Senior & functional managerial support ▪ Open & honest information sharing ▪ Accurate & comprehensive measures ▪ Trust bases, synergistic alliances ▪ Supply chain alignment & rationalization ▪ Cross-experienced managers ▪ Process documentation & ownership ▪ Supply chain education and training ▪ Use of supply chain advisory councils ▪ Effective use of pilot projects

Source: Fawcet, 2001, p. 12

V. RESULTS AND DISCUSSION

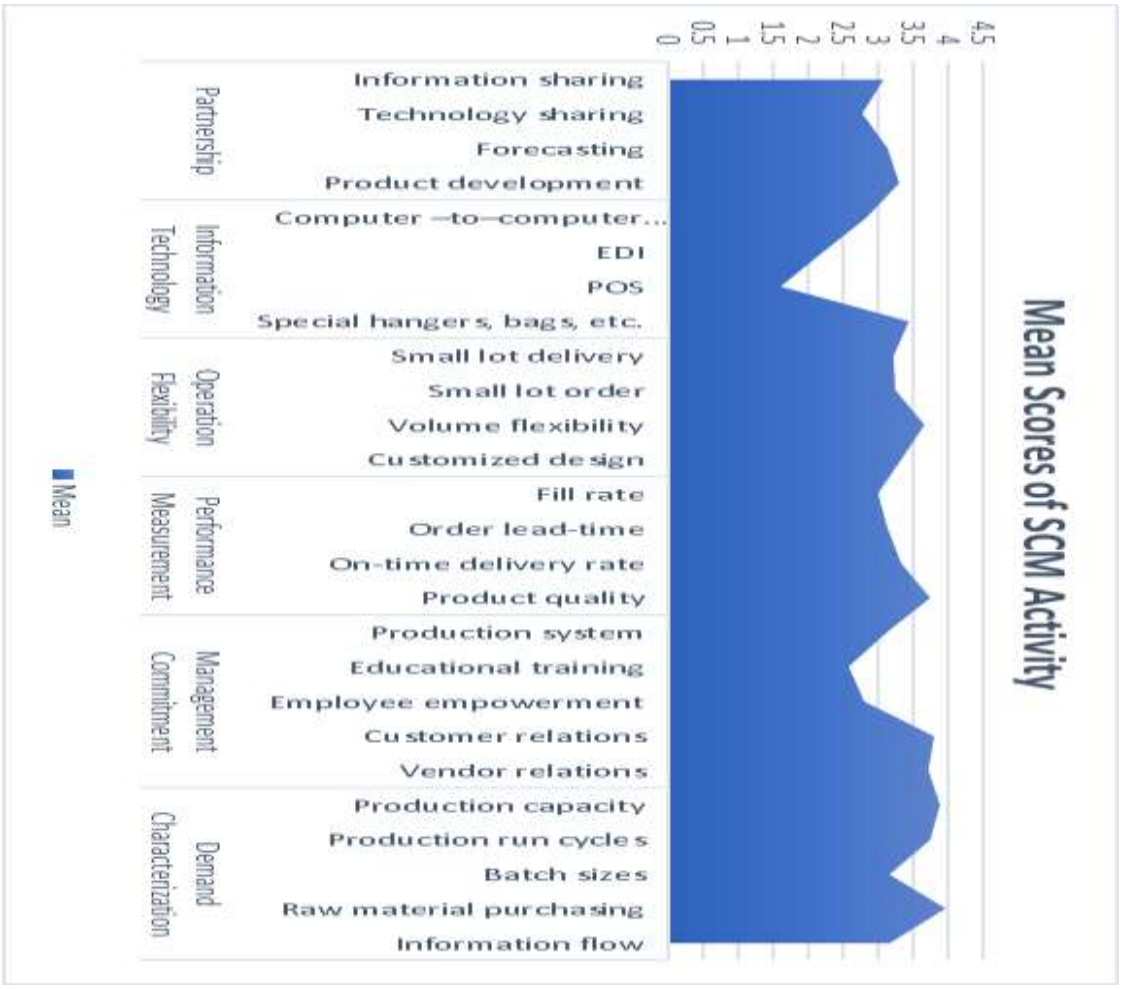
Uncertainty in the supply chain may also be derived from unreliable supplier performance. The extent of supplier performance in terms of total cost, delivery performance, and the characteristics of relationships with fabric suppliers may contribute to textile manufacturers' performance. Lastly, as the retailers are more concerned with the small lot orders on a daily basis, retailers are shifting the burden of inventory to manufacturers. And the retailers' characteristics such as retailer size, relationship, and type have been found to influence textile manufacturers' managerial decisions.

The focus of this paper was to study the relationship between SCM activities and other textile manufacturing activities. The SCM activities are defined in study into six dimensions. These six dimensions are partnership, information technology, operation flexibility, performance measurement, management commitment and leadership, and demand characterization. Each dimension consists of

four to six activity items identified and conceptualised through literature analysis. Respondents were assessed for their level of agreement with 26 items that characterize the SCM activities in the six dimensions. Each item was rated on a Five- point scale with 1 = not at all to 5 = very high. Table 4.4 displays the mean scores and standard deviation of the 26 scales.

Based on the mean scores, respondents seem to be well aware of importance of product demand patterns (e.g., trend, seasonality, randomness) in purchasing raw materials and setting production capacity with mean scores of 3.97 and 3.88 respectively, while information technology such as EDI and POS were not generally used. The mean scores of the two technology activities are 2.22 and 1.62 respectively, lower than the average score of the scale (2.50). The scale has 0 and 5 for the extreme points.

Figure 3: Mean Scores of 26 SCM Activity Scales



Calculations:

Mean, SEM, SD calculations & hypothesis testing by t – tests for the Mean

Scores of 26 SCM Activity grouped into 6 parameters.

Mean Score Data = [3.08, 2.78, 3.14, 3.32, 2.84, 2.22, 1.62, 3.45, 3.24, 3.25, 3.66, 3.33, 3.01, 3.14, 3.35, 3.75, 3.15, 2.58, 2.81, 3.81, 3.73, 3.88, 3.75, 3.16, 3.97, 3.16]

[Mean, SEM and SD]
Arithmetic Mean = 3.1992307
SD(n) = 0.51917034 (Standard Deviation)
SD(n-1) = 0.52945197 (Standard Deviation)
SEM = 0.10383407
(Standard error of the mean)
n = 26

[Confidence Interval (CI)]
95% CI : 2.9853804 --- 3.413081
t(25, 0.05) = 2.0595
99% CI : 2.9098 --- 3.4886615
t (25, 0.01) = 2.7874

[Others]
Sum = 83.18 (Sum of Samples)
SS = 7.0079846 (Sum of Squares)
V(n) = 0.26953787 (Variance)
V(n-1) = 0.2803194 (Unbiased variance)
SD(n) = 0.51917034
(SD of sample group.
EXCEL: STDEV.P function)
SD(n-1) = 0.52945197
(SD as estimate for population.
EXCEL: STDEV function)
%CV = 16.227976
Skewness (g1) = -1.0161155
(Skewness of sample group.
EXCEL: SKEW.P function)

Skewness (G1) = -1.0794152
(Skewness as estimate for population.
EXCEL: SKEW function)

Kurtosis (g2) = 1.4357414
(Kurtosis of sample group.
EXCEL: no function
Normal Distribution: g2 = 0)
Kurtosis (G2) = 2.0274012
(Kurtosis as estimate for population.
EXCEL: KURT function
Normal Distribution: G2 = 0)

[Various Means]
Arithmetic Mean = 3.1992307
Geometric mean = 3.1491125
Harmonic mean = 3.0878172

The calculated value of t (25, 0.05) = 2.0595 which is more than the t critical value at 95% CI i.e. t $(_{(\alpha=0.05)}$ =1.96),

Based on studies through literature review Supply Chain Management stages has been identified and conceptualized into 4 stages leading to 6 dimensions, each of these dimension leads to 26 activities altogether. Study revealed that with relevance to Supply Chain Management practices, based on the mean score respondents were well aware of the importance of many of these activities of Supply Chain and hence issues were addressed if any, however few of the activities were identified as critical to effective supply chain and were problem areas.

The stages of SCM was derived from literature review and was categorized into 26 activities , each of the activities was studied to understand their impact on the effectiveness of the supply chain • Findings clearly indicated some of the activities, having a major impact on the Supply chain, hence making them critical, however few of the activities showed less impact with reference to either product characteristics or production system. Hence the study reject the null hypothesis that the level of $H1.1_o$ =The Implementation stage of Supply Chain Management activities among textile manufacturers are not different is rejected.

The stages of Supply chain are majorly to do with Plan, Procure, Make, Deliver & Return. It was found that most critical stage was activities that were a part of Procure & Make stage. The most important finding was the fact that at every stage , communication was considered important and the need for Technology support was considered most important. For Textile manufacturers to be efficient

participants in SCM, they need to adopt the innovativeness of SCM in systems, policies, devices, programs, products, or services. As supply chain is as a network of three or more entities directly involved in the upstream and downstream flows of products, services, finances, and/or information from a source to a customer, management of it is a complex task. Management of supply chain therefore requires the planning and control of activities to achieve a desired goal and shaping the organization by coordinating activities, goals, interests and relationships to be able to resolve conflicts and make good decisions.

The findings indicate that on the parameter like on time delivery, product quality, employee's empowerment, production capacity, run cycles & RM purchasing product characteristics does have a significance variation or influence. On the parameters of production system and education training product characteristics have no impact or less impact on importance of production system and education training in SCM.

The findings indicate that a high level of SCM activities in all the dimensions at the same time does not necessarily guarantee the favorable performances although Textile manufacturers can invest more to implement SCM activities and expect to see apparent improvement The further studies can be undertaken in comparing the Textile manufacturers' efficiency, a common performance measure such as inventory performance measures used in this study might not be a good indicator of level of SCM activity implementation

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