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Silk Manufacturing and Supply Chain Management in India-Present Complexities and Future Challenges under the Shadow of Past Glory

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Abstract

India is the foremost shopper and second maximum producer of raw silk in the world. The necessity for Indian Raw silk is projected to yield at the rate of 5-7% per annum. Assam, the doorway of India is famous for natural silk, particularly for Muga and Eri silk. Muga is widespread in the North Eastern Region of India since nowhere in the world, Muga silkworm can be reared except this region. Assam is the world prime producer of Muga silk and Eri silk. As per the indicator report that every silk sector has a chain from silk larva eggs to the fabric. In present, We analyze the challenges in silk manufacturing and supply chain in India, the require for import of Raw silk and clear suggestion to make stronger the Supply Chain in Silk Industry by applying six sigma which will cover way to bring an orderly approach in silk manufacturing sector as well as to develop the Quality of silk products created in India.

Keywords: Muga Silk, Eri Silk, Six Sigma, Supply Chain, Silk Industry.

Introduction

The silk is created of proteins concealed in the liquefied formation by a caterpillar called as 'silkworm', is identified as natural silk. Different stages of silkworm such as egg, worm, pupa, and moth. Human beings interfere the various stages of cocoon stage to obtain the silk, a continuous filament, which has got high demand in the market. Six Sigma is an extremely disciplined method that aids us with the emphasis on growing and delivering standard products.

Sigma is a numerical word that calculates how far a given procedure diverges from precision. The six sigma method is used to find the defects involved in this method, and it provides the solution to remove the defects (Raja et al. 2014).

Indian Silk Industry is transient over a challenging segment in a domestic segment as well as in export segment. In internal sector the tasks are decreased in mulberry area, observe of an age-old conservative system for production of raw silk, low efficiency, a hill of beans contribution by farmers and reelers, poor quality silk in the International Standard, slow development in the internal production of silk, etc. On the export sector, deficiency in orders and demand in the international market, arise of Chinese cheap silk products in the country over illicit networks that are resulting in defeat in the export of silk. Six Sigma tool has implemented in areas of quality silk manufacturing, finest productivity levels, and supply chain management (SCM) for the whole development of Silk Industry. The concept of SCM in silk industry using six sigma methods is discussed in this proposed method. It predicts an exploration of the factors manipulating the Supply Chain Management right from silkworm egg to silk fabric consumers both in an internal sector and external sector (Babu, 2013).

The remainder of this paper is organized as follows: Section 2 examines literature review in supply chain management in textile industry. Section 3 briefly discussed the Objective of the study and hypothesis. Section 4 discusses the scenario of supply chain management in Indian silk industry. Section 5 presents the application of six sigma in silk yarn supply chain. Section 6 concludes the paper. Section 7 provides suggestions for better organization.

Literature Survey on Supply Chain Management in Textile Industry

The Studies conceded by Jimmy et al. (2006) explained that the

representative trouble fronting with apparel supply chain is short product cycle for fashion articles, long production lead time and estimating errors for fashion items. The Hong Kong textile and clothing supply chain faces other difficulties in distance from consumers in the U.S. and European markets, minimum manpower and longtime production and, quota restrictions in U.S. Market were the factors that compelled to develop effective product and competitiveness over supply chain management.

Visibility (Bartlett 2007) is very significant in supply chain in order to develop clearness (Lamming et al. 2001) all through the delivery of quick and exact information outcomes in wrong estimates of the list at diverse phases of the supply chain resulting indifference among exact necessities orders placed and delivered list, is called as "bullwhip effect" (Lee H L et al. 1997). Lack of visibility decreases the real-time traceability of supply which results in the extremely common troubles of obsolescence supply, overstocks of the previous supply in the stores and store out of the running supply is in require. Indian Garment Corporations are antagonizing the perceptibility trouble at each stage of their supply chain that is the elementary reason of lack of management and high supply levels the industry is facing. Because of low perceptibility in the supply chain, Garment corporations face the delinquent of delayed reaction time and low responsiveness to the patron and marketplace demand which is created worse over the longer lead times.

Factors of Mulberry Silk Cocoon Quality

The silk quality is prejudiced by silkworm races, rearing management and the process used for reeling such as cocoon stifling/drying, sorting, storing, cooking, and reeling and the skill of the reeler. The quality of silk cocoons rests on all features and measures the diverse facets of quality cocoons. Though many parameters are elaborated in assessing the cocoon and raw silk quality, each parameter is linked with a convinced amount of ease or trouble in assessment. Silk recovery and renditta are correlated with breeds reared by the farmer's cocoon quality depend upon the quantum of feed given to the silkworm, upkeep of temperature and humidity at the time of rearing and mounting and the reeling technique. Hence, the fanners must be educated on these aspects to improve the silk quality produced in the country (Kumaresan et al., 2010).

P.R. Wadje and M.J. Doshi (2008) observed that supply management is the biggest challenge for the textile industry. It is estimated that greater than 25% of the World's textile trade will be controlled by retail giants. In such a scenario a capable supply chain organization cannot be overemphasized. The retail giant will determine the export price, and only an effective supply chain will be able to compete effectively. Any firms in India have an occurrence in the whole textile chain from yarn to garments.

SCM is explained as the incorporation of solution business method as of end-user throughout innovative dealers that offer products, information, and service and therefore add value used for

consumers and other stakeholders (Lambert et al. 1998). In a global supply chain of the textile industry, the main goal is to deliver a quality product to consumers at a reasonable cost and to enlarge the profit scope for depositors and stockholders. The product price has mostly three mechanisms [Raja, I. D et al. (2014)] raw materials Procurement such as silk yarn, supplies and fabric the manufacturing procedure and freight to consumers. Furthermore, Government constancy, dependability, violence, compassion to commitment and time of delivery are other factors. Hong et al. (2004) recommended four types to calculate the performance of SCM in Fashion and Clothing Industry. These comprise organizational factor, management factor, relationship factor and information technology factor.

Firms working SCM inquire about to decrease waste all over the supply chain by reducing duplication, balancing functioning and systems and improving quality. When fabrication and logistics process is completed in less time, all entities in the supply chain can handle more professionally, and primary result is the abridged inventories during the system. It is a collective practice for clothing retailers to deal with manufacturers, with centralized buying and considerable concession on prices, quality, and delivery schedules. However, Popp (Bruce, Daly & Towers et al., 2004) suggests that in addition, in many chains there is an intermediate, export and import agencies plays a vital role in supply chain Quality is the primary key in the textile industry and the competition does not for each firm but the entire supply chain.

Objective of The Paper

The paper has been developed to identify the supply chain linkages of natural silk industry as well as different constraints in each activity of the linkage that is being encountered by the sector in India.

Hypothesis

This study is prepared by using the evidence which was specified by the respondents. The information collected from the plaintiffs is relevant to that period. Convenient Random Sampling has been agreed mainly because of the scarcity of a systematic sampling frame. However, the Government announced the policies it would directly affect recommendations made to the silk industry. The Hypothesis set and tested, be contingent on certain standard assumptions,

Hypothesis 1a

H₁

There is significant difference between Marketing of silk & silk products and climatic conditions.

H₀

There is no significant difference between Marketing of silk & silk and climatic conditions.

Hypothesis 1b

H₂

There is a significant difference between the design of products and capacity of sales.

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H₀

There is no significant difference between the design of product and capacity of sales.

Hypothesis 1c

H₃

There is a significant difference between increases of cost and the capacity of sales

H₀

There is a significant difference between the increase in cost and the capacity of sales

Hypothesis 1d

H₄

There is a significant relationship between the distribution channels and capacity of sales.

H₀

There is no significant relationship between the distribution channels and capacity of sales.

Hypothesis 1e

H₅

There is a significant relationship between promotion of the sales and capacity of sales

H₀

There is no significant relationship between the promotion of the sales and capacity of sales

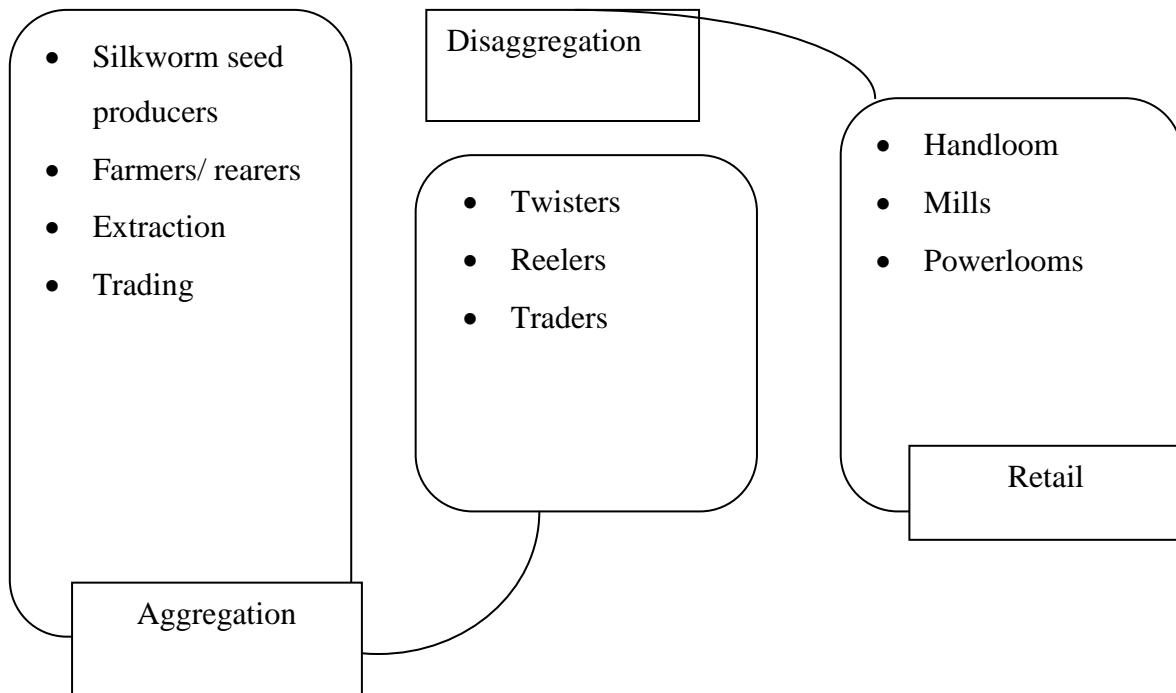
Scenario of Supply Chain Management in Indian

Silk Industry

The SCM can generally be classified into domestic, and the External segment in India and these two topics have to discuss in detail to discover the likelihood of familiarizing six sigma as both are very strong, diversely different and quite voluminous in physical and financial form.

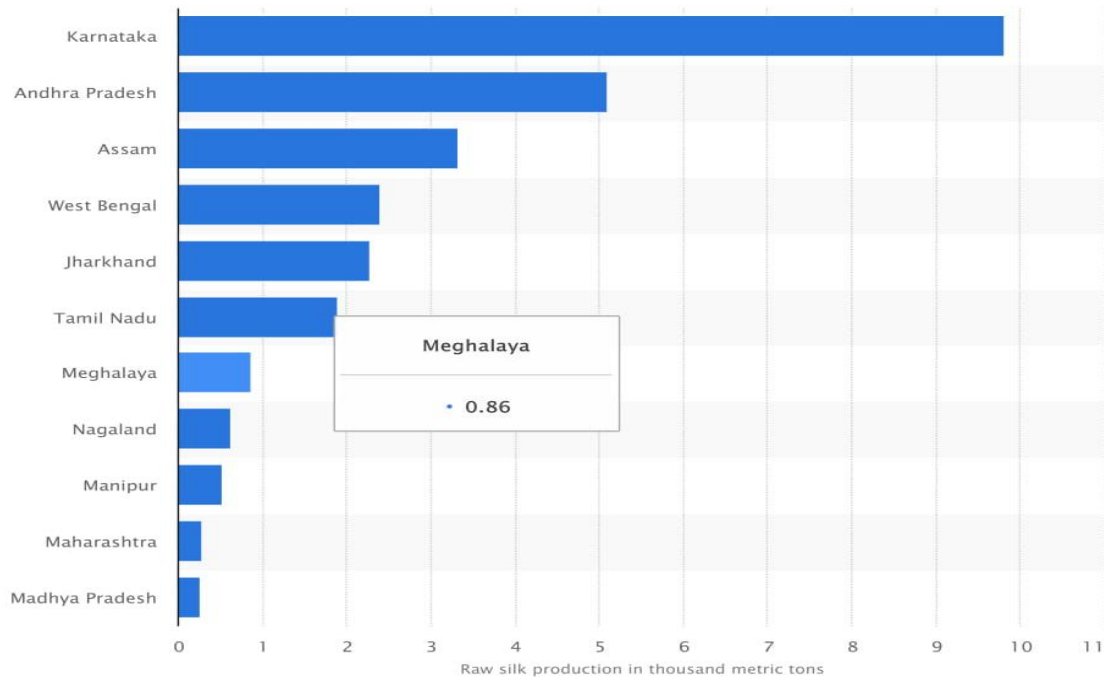
The supply chain management in an internal sector of India is more unorganized and decentralized chain of activity, with the scattered cluster based and community-based activities. It involves the various chain of activities starting from laboratory level production of commercial silkworm eggs, Chawki (young worms) silkworm rearing farmers, late age silkworm rearers, Govt cocoon markets, reelers, twisters, dyers, designers, weavers, master weavers retailers and consumers. Majority of internal sector produces silk sarees which have very large demand in spite of the stiff challenge due to fashion dressing and lifestyle changing. The total lead time for production of silk sarees right from egg to fabric is estimated to be 140 days in general. This can be significantly reduced by integrating or combining into two or three activities like reeling cum twisting or reeling cum twisting cum dyeing or twisting cum dyeing or dyeing cum designing cum weaving.

Fig :1-Silk Supply Chain



The following figure.2 shows the quantity of Silk Production and quantity of silk imported to meet the demand for silk for domestic consumption.

Fig: 2-Silk Production Quantity



The indicator provides the quantity of raw silk fabrication in India in 2015-16, by state wise. In that year, Karnataka was the important raw milk producer, with over 9,800 metric tons of raw silk produced, and followed by Andhra Pradesh with almost 5,000 metric tons of raw silk.

Supply Chain Management and Total Quality Management

SCM is the concise form of TQM idea, and together tools are activated for the business development with patron fulfillment. TQM theoretical

definition recommends that the determinations agreed to increase the traditional business to achieve complete excellence for the satisfaction of the patron. SCM is also a patron-centered business process that links manufacturer, retailer, customers, and distributor to diminish operational cost. It is commenced at different stages of production. It is a science movement of materials, intermediates, and finished products from the producer to customer effectively and efficiently. The overall view representing requirements of TQM and SCM are as follows:

Table: 1-Difference between TQM and SCM requirements

S.No	TQM Requirements	SCM Requirements
1	Committee Management Participation-To provide long-term Organization support	Demand Management /Forecasting
2	Customer-Centered Approach	Domestic and Import Regulation
3	Entire workforce involvement	Regulated Market and logistics from farmers to Reeler
4	Supplier Partnership concept Reinforcement	Distribution and Deployment
5	Continuous Improvement in Production Process	Available to Quality (Denier Level)
6	Establish Performance measures for the Process	Supply Chain Modeller

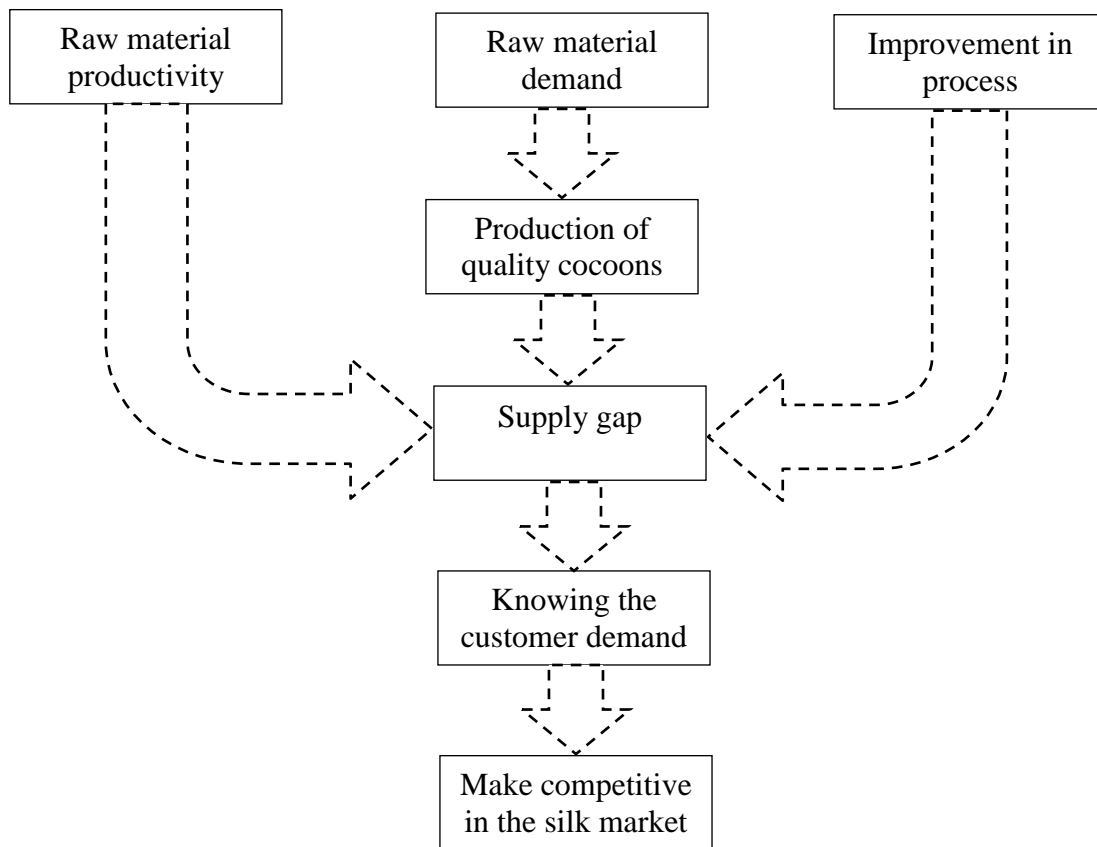
Application of Six Sigma in Silk Yarn Supply Chain

The recent Research at Cranfield School of management has emphasized that the spring of risk in the supply chain must be a bared faced lie and that risk might be alleviated and accomplished by six sigma attitudes and procedures. Feasibility of using six sigma tools to develop silk yarn supply chain was taken up by the investigation team. Pre-define stage study bears that many input factors contributing to a wider gap in the demand, cocoons supply, and silk yarn are not under the control of either the farmers or the reelers.

The prime reasons are absence of sufficient technical knowledge to rear the silkworm, inadequate

Technical support for cultivation of mulberry (food plant for silkworm), transportation of cocoons from farm to cocoon market and reeling units from the farmer perspective no knowledge of quality measures and the clear understanding quality needs of yarn on the part of reelers. Proper linkage in the source could not be established due to farming policy, cocoon quality, testing standards, pricing policy (central and state norms), Subsidy for the produced yarn are the real practical problems, which breaks the supply chain. It can be ascertained from Figure. 1 that there is a gap between demand and supply of raw silk. The block diagram given below explains the real supply chain scenario.

Figure: 3 -SCM cycle for silk manufacturing



The gap could be minimized by increasing the raw material production qualitatively and quantitatively. The qualitative improvement could be achieved through process improvement. Ultimately resulting in reduced gap facilitating fulfillment of customer requirements.

Six Sigma plays a vital role in minimizing the variation. When we emphasis on the Supply Chain metrics, the difference may lie in lead time to procure yarn, cost differential in the raw material as well as logistics, quality of the product, quantity of availability in the market, facilities available for storage and handling of raw material in the market area, number of suppliers in the market (especially the farmers), just in time gap for the reelers. Since the area of application is wide and it warrants specific zone application, the researcher thought fit to check whether six sigma can be applied in the supply chain management of silk Industry. As a result, the study went on with the broader perspective of making on the simple basic tool of six sigma SIPOC.

Conclusion

SCM is a methodical method to develop the total yield in the Silk Manufacturing Industries by enhancing quantity of raw material, the timing, location and flow from farm to cocoon market, reeling units and to weaving units site using IT infrastructure and interacting with all the related intermediates and that is predictable approach for implementing TQM viewpoint to improve organization System. SCM and TQM are the paths for cost-effectiveness and the chain related to the business, but they both originated

from farmers to reelers. There is a scope to make stronger the supply chain management in Silk Industry by applying six sigma methodologies.

Suggestions

Interpretations made in the study of improving cost-effectiveness through the proficient supply chain management in India. Conclusions drawn thereof can use to brand suggestions for augmentation in their enactment and productivity foremost to the enhancement of organizational profitability. Some of these suggestions are as follows:

1. The society has to understand and recognize supply chain as an income gainer in Indian industry.
2. Cost and asset management, Reliability, responsiveness, flexibility, are the key factors for supply chain performance.
3. Usage of Information technology application tools is the key factor for further exploration.
4. The society should use staffing methods like job skill matrix competency-based recruitment, psychometric test for suitable selection of human resources. Proficiency is to be adopted by deploying proper human resources in the supply chain
5. By arranging training programs for the employees to sustain the standard quality.
6. Several springs and methods like annual evaluation, gap analysis, global benchmarking, collaboration, and functional forums and so on are the strategies used for enhancing profitability.

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7. Frequent monitoring of financial and production and marketing makes the path for success
8. Formation of organized cocoon marketing system is necessary for operative marketing and sustained the growth of the industry.
9. Common Facility Centers (CFC's) for spinning and reeling of cocoons, added value to the produce of the reerers and promote trade in yarn rather than cocoons, which is a perishable commodity, should be encouraged.

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