COMPETITION FROM SYNTHETIC FIBERS AND ITS IMPACT ON THE FUTURE OF COTTON

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Abstract

Cotton is one of the most important textile fibers in the world, produced in about 80 countries around the world. But, cotton is losing its attractiveness in the global textile markets due to various factors, and also the US cotton sector specifically is faced with unique competitive forces, which are threatening its place in the global textile markets. In this context, this paper analyzes the threat posed by the synthetic fibers to global cotton markets. Our study analyzes the global supply and demand of synthetic textile fibers in comparison with that of cotton textile fibers. This paper also analyzes the global macroeconomic factors that impact the production and consumption of cotton and synthetic fibers. The study also includes understanding the economics of synthetic fibers in comparison with that of cotton fiber. The analysis is done by reviewing the literature about cotton and synthetic fiber sectors in various countries as well as the authors' own observations and discussions with people in those sectors in some countries. The results show that synthetic fibers have surpassed cotton in terms of production and consumption in all the global markets and they continue to grow at healthy rates. The decreasing raw material prices for synthetic fibers is also helping them to become more competitive to cotton in many product markets. In this background, we conclude that cotton sectors worldwide have to innovate, create new products with better characteristics and to meet the needs of consumers in developing countries.

Introduction

Cotton is one of the most important textile fibers in the world, produced in about 80 countries around the world. China, India and the US are the leading producers of cotton accounting for two-thirds of the total world production, and US being the leading exporter of cotton, contributing about a third of total world exports. It is a very important commodity to agricultural economies of various countries providing livelihood to millions of people directly. But, cotton is losing its attractiveness in the global textile markets due to various factors, and also the US cotton sector specifically is faced with unique competitive forces, which are threatening its place in global textile markets. Since the advent of synthetic fibers, they have been used as substitutes for cotton and lately the threat from synthetic fibers to cotton has increased manifold. In addition, cotton sector in the US is also facing threats from various other quarters. The threats can be the competition from the emerging or potential new entrants in global cotton markets, from the bargaining power of buyers/importers of cotton and from the bargaining power of input suppliers to cotton sector like the seed and chemical suppliers. In this context, it is necessary to analyze the competitive forces/threats faced by the US cotton sector to understand their impact on its performance in the future. The analysis of the competitive forces and the threats posed by them is done by utilizing the Porter's five-force framework (Porter, 2008). The Porter's framework based upon the structure-conduct-performance paradigm in industrial organizational economics helps in analyzing the level of competition within an industry and competitive strategy development. The five forces of competition that the US cotton sector faces include, the threat from existing major cotton exporters such as India and Brazil, the threat from new entrants or smaller players like West African and Central Asian countries, the threat from substitutes for cotton, the bargaining power of buyers like China and the bargaining power of suppliers of inputs to cotton cultivation. Our previous research and associated presentations have covered threats faced by US cotton sector from emerging cotton growers and bargaining power of countries like India and China.

In this research paper, we focus on the threat posed by the synthetic fibers to global cotton markets. Our study analyzes the global supply and demand of synthetic textile fibers in comparison with that of cotton textile fibers. As the global consumption of synthetic fibers has already surpassed the consumption of cotton, it is important to understand the factors that impact the buyer propensity to substitute cotton and whether there are any favorable trends to cotton in the future. Markets of China and India have been analyzed along with that of the US to capture the micro and macro economic factors that will impact the production and consumption of synthetic fibers. The study also aims to understand the economics of synthetic fibers and compare it with economics of cotton fiber. Getting an understanding

of the economics of synthetic fibers in comparison with cotton fibers helps us in chalking out better strategies for cotton sector. The analysis is done by reviewing the literature about cotton and synthetic fiber sectors in various countries as well as the authors' own observations and discussions with people in those sectors in some countries. Many experts have emphasized that cotton sector worldwide has to innovate, create new products, new ideas and new technologies to deliver value to the cotton consumer (Lyon, 2014). We expect that the findings of our study will help in keeping cotton as a better choice in face of the competition from synthetic fibers.

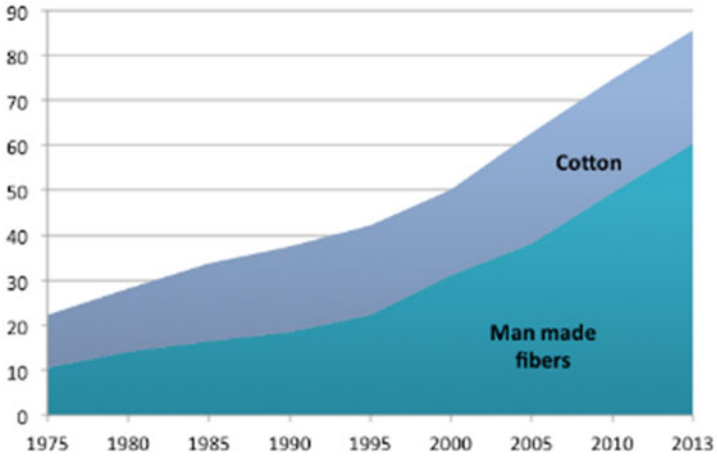
Figure 1: Porter's Five-Force Analysis

In the following section, a discussion is provided about the threats from various synthetic fibers. A brief analysis of strengths and opportunities are provided where possible. The last section provides the conclusion for the study.

Results and Discussion

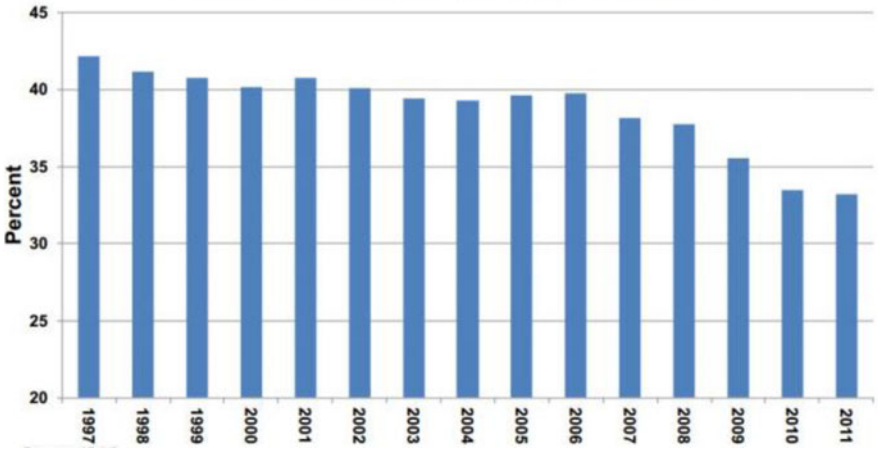
The production of textile materials has undergone many changes since the inception of textile industry. Natural fibers like cotton, wool and silk maintained their dominance until 1930s after which the synthetic fibers also became important. During the 1960s, the synthetic fibers swept the global textile markets and their dominance prevailed since then (Textile World, 2015). The production of cotton in relation to synthetic fibers is shown in the below figures 2 and 3. The share of cotton in world fiber consumption also showed a decline as shown in figure 3 due to various reasons. The textile industry around the world has introduced synthetic fibers into products that have traditionally been considered cotton products, due to volatility in cotton prices. As the consumers have accepted this change, it is felt that the manufacturers may be reluctant to add more cotton back into these products (International Ag Trade Report, 2012).

In this study, we will be focusing upon the competition posed by various synthetic fibers to cotton. The important synthetic fibers that are considered in this study are Polyester fibers, Polyamide fibers (Nylon), Acrylic Polypropylene fibers, Cellulosic fibers and others. The composition of the various fibers in the total synthetic fiber production of 2013 is given in figure 4 below. The polyester is the most dominant of the man-made fibers constituting almost three fourths of the total man-made fibers followed by cellulosic fibers. According to the United Nations, the world per capita production of man-made fibers reached 12.35 pounds per person in 2000, after more than three percent growth rate during 1995-2000 period, accompanied by almost 5 percent growth in production per year (Textile world, 2004).



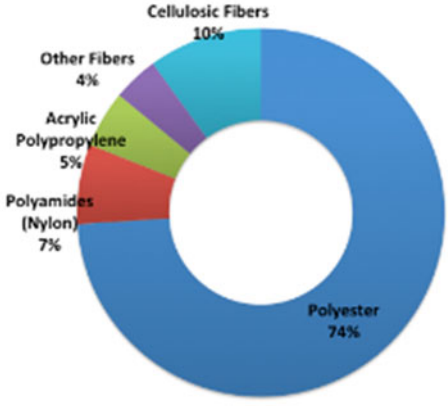
Source: PCI Fibres, ICAC, IVC ev

Figure 2: World Production of Cotton and Man-Made Fibers (million MT)



Source: FAS, USDA 2012

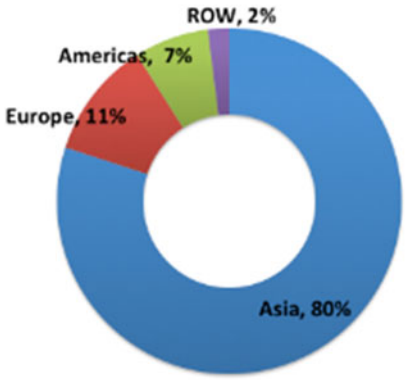
Figure 3: Cotton Share of Total World Fiber Consumption



Source: PCI Fibres, IVC ev

Figure 4: Composition of Man-Made Fibers, 2013

Most of the production of the man-made fibers happens in Asia followed by Europe and USA as seen in the figure 5 below. The Asian countries like China, S. Korea and India have built large export businesses by vertically integrating fiber, fabric and garment manufacturing industries thereby attaining logistic and other supply chain efficiencies (Mills 2011, Qin 2014). Attractive wages and friendly environmental regulations also helped to a great extent for the establishment of the man-made fiber industry in Asian countries.



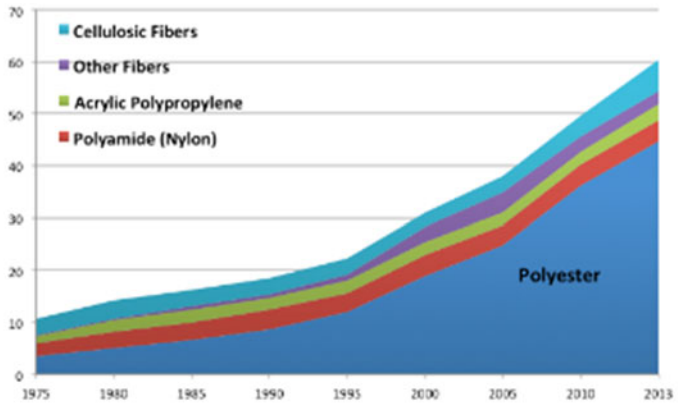
Source: PCI Fibres, IVC ev

Figure 5: Regional Man-Made Fiber Production, 2013

Out of the many man-made fibers that are available, this study focuses on the major fibers like polyester, nylon and cellulosic fibers in the analysis. The outlook for these man-made fibers is given in the below paragraphs.

Polyester

The world production of Polyester has grown by more than 7% in the last five years, with most of the growth happening in China. The production in China constitutes almost 65% of the total global production and in all Asia together, about 90% of global production (Mills, 2011). The growth rate of polyester is more than the average growth rate of all other man-made fibers. Almost 3 million metric tons of capacity has been established in China during 2014 alone (Kim, 2015). Countries like South Korea and India have also increased their capacity in the last few years, which is leading to overcapacity. It is observed that the capacity utilization is less than 70 percent on a global level in polyester sector. It has also led to decreased margins in polyester industry, which is calling for capacity rationalization in various countries. But, due to the increased substitution of cotton by Polyester, it is expected that polyester production is going to grow at 6 percent per annum over the next ten years (Kim, 2015). The limited growth rate of cotton due to high prices (see figure 7) in recent years and fluctuating policies in various countries also led to polyester being used more as a substitute for cotton. Even in the active wear market which is the fastest growing segment in US apparel market (NPD Report, 2014), the cotton active wear which is most comfortable and popular is being replaced by polyester and nylon active wear. This is attributed to problems in cotton active wear like wrinkling, fading and stretchability, which are overcome in polyester active wear much more easily.



Source: PCI Fibres, IVC ev

Figure 6: World Production of Man-Made Fibers (million MT)

Polyester is also considered to be environmentally sustainable than before when the Life Cycle Assessment (LCA) methodology is taken into consideration. Kalliala and Nousiainen (1999) proved that though cotton fiber production consumes about 40% less energy than polyester fiber production, the overall usage of energy during the life of a cotton product is much higher than the mixed fabrics (50% cotton 50% polyester). This is due to higher durability and lower laundry energy requirements during the usage phase of the product.

The recent dip in the petroleum prices is also impacting the polyester and other synthetic fiber prices, leading to more competition to cotton. As seen in table 1 below, the polyester raw material price has decreased by almost a third during the period 2013-15 in China, which is the biggest producer of polyester in the world. Even though the price of cotton has fallen during the same period (see table 1), polyester clearly became more competitive compared to cotton and it is expected to continue as petroleum prices are expected to go down further in the future. Also, technology pertaining to usage of recycled PET and plant based feedstock for polyester production is being developed and improvised (Swift 2014, Uytvanck 2014), which will create more environmentally sustainable polyester products in the market. This may create potential competition for cotton acreage in many countries.

Nylon

Nylon is the oldest synthetic fiber, but still is being used in various products. Carpet industry is one of the significant users of nylon and it accounts for almost 18 percent of total global usage. Nylon is also being used in various other products like airbags, heavy-duty tires, hosiery and swimwear. However, nylon is being substituted by polyester in many of the products like carpets, tires and many woven industrial apparel. Higher price of nylon over polyester is the leading for its substitution (see table 1). However, it is expected that nylon could grow at a potential growth rate of 1-2 percent per annum through 2025 due to increased demand from markets in China and India (Qin, 2014).

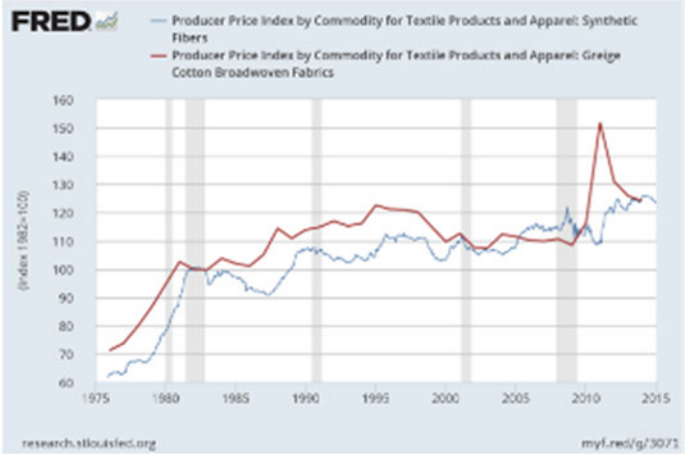


Figure 7: Producer Price Index of Synthetic fibers in comparison with Cotton Fabrics (1982=100)

Acrylic fibers

The production of Acrylic fibers happens mostly in China and it has remained stable in the last few years. Polyester is giving a tough competition to Acrylics as well due to its low price, but it acrylic fibers are being increasingly used as substitutes of wool. The unique chemical resistance of Acrylic fibers finds many uses in water and gas filtration devices thereby finding place in clean water and air initiatives. Acrylic fiber production is expected to grow at an annual rate of 1-2 percent through 2025 due to weak supplies of wool and better manufacturing practices and technologies (Qin, 2014).

Table 1: Comparison of Fiber Prices (c/lb)

Fiber	Type		Dec-13	Dec-14	Dec-15
Cotton	Cotlook A Index		90	69	71
Polyester	150 Den POY	US Delivered	112-118	100-109	94-100
		China (C&F)	63-65	52-54	41-45
Nylon	40 den tex	US Delivered	365-380	365-380	365-370
	70 den weaving	Asia (C&F)	153-159	143-148	102-104
Viscose	1.5 den	China (C&F)	77-79	72-76	82-84
Spandex	40 den, warp-kni	US Delivered	400-480	420-505	420-505
		China	351-377	323-351	241-283

Source: PCI Fibres, ICAC, IVC ev, Author's own calculations

Cellulosic fibers

Production of Cellulosic fibers is growing due to increasing substitution with cotton and due to more usage in nonwovens. Cellulosic fibers had a steady decline during 1980-2000 period, but they recovered after that period due to demand from Chinese markets. It is expected to grow at an annual rate of up to 5 percent through 2025 driven by demand in Chinese market (Qin 2014, Mills 2011).

Conclusions

As observed in our analysis, the threat from synthetic fibers is significant for cotton and may play an important role in defining cotton's future. As mentioned by Lyon (2014), that in order to meet the competition from the synthetic fibers, the cotton sector worldwide has to innovate, create new products, new ideas and new technologies to deliver value to the cotton consumer. There is lot of scope for improving the per-capita consumption of cotton in developing countries on par with developed countries. The apparel needs of increasing global population especially in the developing countries and their rising purchasing power gives ample scope for increasing the usage of cotton by capturing the 'cotton' needs and 'denim' potential among younger population. Marketing cotton apparel as a 'necessity' rather than a 'luxury' product as it is done in many developing countries presently can also increase the

demand for cotton. This can be done through innovative promotion campaigns and creating new cotton products which have characteristics like easiness of washing, anti-wrinkling, better stretching ability, shorter drying times, etc. By improving on the above characteristics, cotton can be made into much more environmentally sustainable product by reducing the energy usage during its 'usage' phase of its life cycle compared to polyester and other synthetic fibers. It is also important to provide superior customer service for consumers while they are purchasing cotton apparel with the help of chain members through better online shopping experience, etc. The returns from these value added services in cotton markets can be considerable and may create more demand for cotton fabrics.

Note: In this study, man-made fibers include Polyester, Nylon, Acrylic, cellulosic fibers and other fibers. The term synthetic fiber is used to indicate all the above fibers except cellulosic fiber. As some of the figures have information about cellulosic fibers as well, the titles include man-made fibers though the paper focuses upon synthetic fibers.

Acknowledgements

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