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Outlook for the U.S. Short Staple Yarn Industry

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Abstract

While it is possible to use historical data to predict the general trends that will be followed both in yarn manufacturing technology and production, this approach has several inherent dangers. Particular problems are related to 1) preferences associated with geographical location and markets, 2) short term impact of changes in specifications and/or markets, and 3) changes in trade agreements. This paper will survey current trends in staple yarn production and prices in the U.S. and internationally. It will furthermore review the present status of different spinning technologies and indicate likely areas of development.

KEYWORDS: Spinning, Yarn, Yarn Production, Yarn Price, Cotton, NAFTA, Labor

Introduction

Due to the changing global dynamics currently surrounding the textile industry, it is impossible to precisely predict the path that the spinning industry will take in the future. The North American Free Trade Agreement (NAFTA) has had an apparent effect on the U.S. textile industry, but the effect of the more recent agreements, such as the Trade and Development Act (TDA) will not be obvious for some time. Theoretically, these agreements should increase the demand for U.S. yarn, since the details of both agreements include a "yarn forward" clause. However, what *should* happen is not always what *does* happen.

To overcome this problem, this paper uses historical data to examine the different factors that can affect yarn demand and thus, yarn production and price. By doing this, the possible effects that certain factors will have on the U.S. short staple yarn industry can be estimated based on history.

Some of the main factors examined in this paper deal with both domestic and international issues, such as recent trends in yarn production and prices, yarn price components, and international labor productivity. These factors are examined from a historical viewpoint. Each one intuitively should have a relationship to production and price, whether direct or indirect, which, in turn, affects the total quantity produced.

Yarn Production

While exhibiting a general upward trend, U.S. yarn production varied considerably from year to year until 1990, when it began to increase steadily. But in 1994, NAFTA was implemented, and yarn production began to decrease. This trend is clearly

evident in Figure 1. Figure 2 shows the yarn production over the same time scale for Mexico and Canada.

Yarn production decreased in the U.S. after the implementation of NAFTA due to the industry moving mainly to Mexico, and to a much lesser degree to Canada.

Figure 2 shows that the yarn production of each of these countries has increased since the implementation of NAFTA. Mexico's yarn production has increased 211.09% since 1994, and Canada's has increased 51.04%. Yarn production in the U.S. has decreased 10.71%. Looking at the 211.09% increase in Mexico, it appears to be much more dramatic than the US's 10.71% decrease. But, Mexico was only producing 158.0 metric tons of yarn in 1993, the year before NAFTA was implemented. Since 1994, Mexico's yarn production has increased by 342.6 metric tons, and the U.S. has decreased by only 211.3 metric tons. This shows that much of the yarn no longer produced in the U.S. is most likely being produced in Mexico.

Figure 3 shows the total yarn produced in North America compared to that produced in the U.S., Mexico and Canada.

Figure 4 shows the percentages of each of these countries of total North American yarn production and this figure simply reinforces this points of Figure 3. In 1994, the U.S. produced approximately 90% of yarn in North America. In 1999, the U.S. produced a little less than 80%, but Mexico has produced the remaining 10%, with Canada's change being almost negligible.

Yarn Price

When trying to determine the future of the spinning industry, it is important not only to look at historical yarn production, but also yarn prices. By looking at where prices have been, it is possible to recognize trends that will continue into the future. The monthly price of ring spun yarn from 1984 to present is shown in Figure 5.

Despite the variation from year to year, prices for both fine and coarse counts have generally increased until around 1997. After that, ring spun prices have gradually decreased. To understand the reasons for this trend, it is necessary to consider substitute prices. The main substitute for ring spun yarns is rotor spun, or open end yarns. This is due to their increased productivity and lower costs. Figure 6 similarly shows the prices for rotor yarns for the same time period as Figure 5.

Both ring and rotor yarn prices decreased dramatically in July 2001. This can be attributed to many factors including a slowing down of the U.S. economy, as well as the U.S. textile industry; lower cotton prices; and, of course, lower prices yarn imports. However, these factors do not affect the general trend of ring spun yarn prices compared to rotor spun yarn prices.

Whereas ring spun yarn prices have generally increased over time, rotor yarn prices have appeared to decrease. There was a large amount of variation in the price up until 1996, when prices continued to decrease, similar to ring spun yarns, but at a more rapid pace.

One of the most interesting trends is the difference between ring and rotor yarn prices. A comparison of the prices of ring and rotor yarns is shown in Figure 7, based on data obtained from *Textile Industries,* formerly *ATI*.

The prices shown in Figure 7 are for 1984 to the present for ring and rotor yarns of the same count (18/1 Ne). In addition, the difference between ring and rotor yarn is shown. This figure proves that the difference in prices has increased almost linearly with time. The difference in price in October 1984 was $0.13, and the difference in

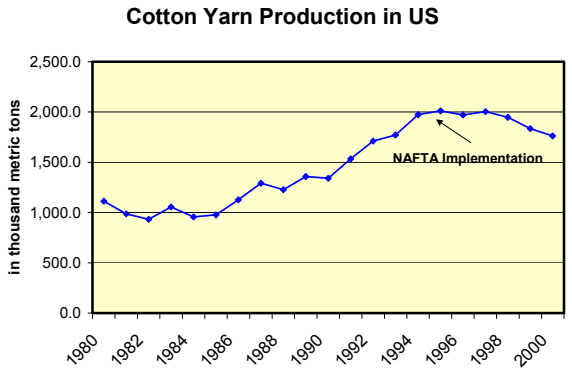

Figure 1: Cotton Yarn Production Since 1980 [1]

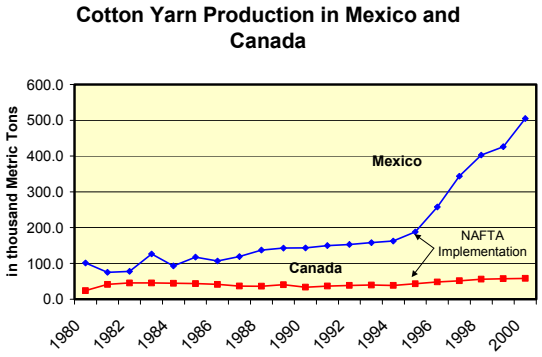

Figure 2: Cotton Yarn Production in Mexico and Canada [1]

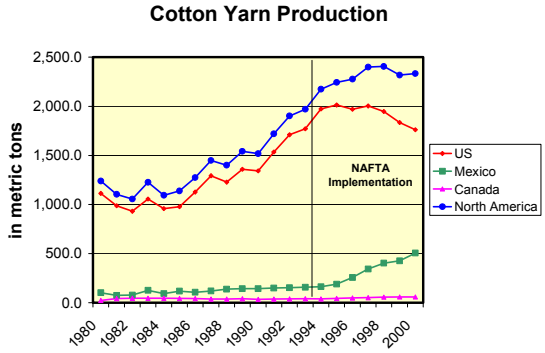

Figure 3: Cotton Yarn Production for North America [1]

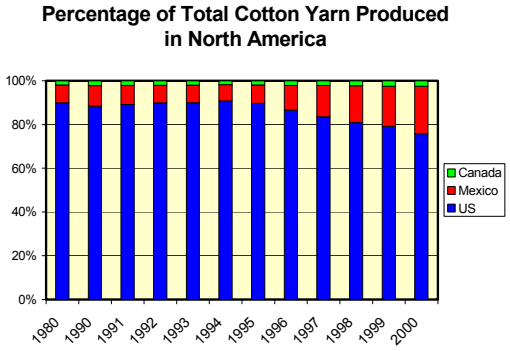

Figure 4: Percentage of Cotton Yarn Produced in North America [1]

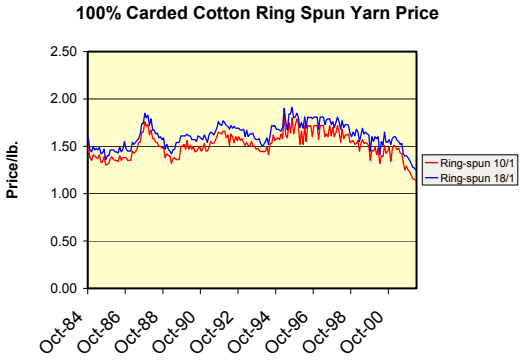

Figure 5: 100% Carded Cotton Ring Spun Yarn Prices [2]

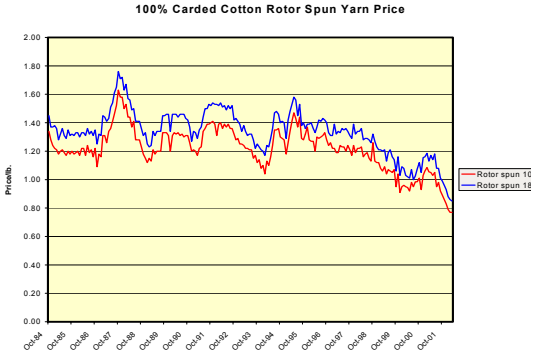

Figure 6: 100% Carded Cotton Rotor Spun Yarn Prices [2]

March 2002 was $0.40. From this figure, it is easy to see that the price difference between ring and rotor yarns is increasing. The reason for the increasing difference in prices is that while ring spun prices have generally increased, until 1997, rotor prices have either remained stable or fallen more rapidly than those of ring spun.

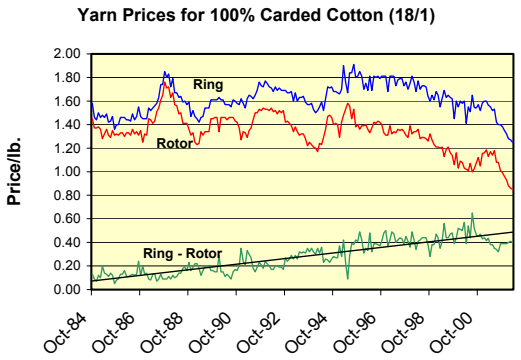

Figure 7: Ring vs. Rotor Yarn Prices for 100% Carded Cotton [2]

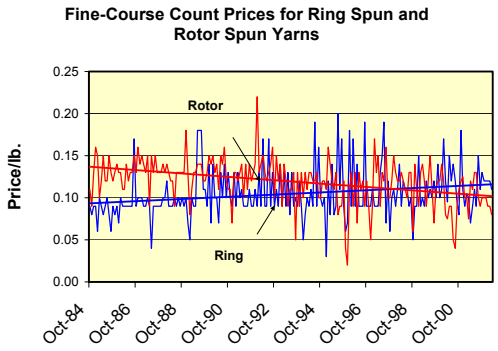

Figure 8: Fine (18/1 Ne) – Course (10/1 Ne) Count Prices for Ring and Rotor Yarns [2]

Another interesting comparison is that of the prices of different counts of both ring and rotor yarns. In Figures 6 and 7, finer and coarser counts seemed to follow the same path for ring and rotor spun yarns. Figure 8 shows the difference between 18/1 Ne and 10/1 Ne for both ring and rotor yarn prices (18/1 – 10/1).

It is difficult to see the trends in the figure due to the variation. The linear trend lines have been added in order to make the trends more visible. While there is considerable variation in price with time, it appears that the difference in price between the finer and coarser counts of ring spun yarn is increasing slightly. This conclusion is different from that for rotor yarns. The difference in price for finer and coarser counts of rotor yarns is decreasing over time.

These figures, generated from data from various sources, have shown the basic trends in yarn prices and production. Simply looking at the trends by themselves is not enough. It is also important to look at the factors mentioned in the first section to see how each of these relate to yarn production and price. By doing this and determining how each affects the other, it may be possible to gain some insight into the future of the spinning industry.

Effect of Spinning Systems

One of the main production differences between ring and rotor yarns is that ring spinning requires two additional processes. These extra processes, roving and winding, make ring spun yarn more expensive to produce. Other costs come in the form of raw material, capital, waste and labor.

Manufacturing Components of Yarn Costs

Most people intuitively believe that labor costs are the main reason why U.S. manufactured yarns are more expensive than imported yarns. Figure 9 shows the main components of manufacturing costs associated with ring and rotor yarns. Here, ring spun yarns are about fifty cents higher than rotor spun yarns. This is consistent with the previous Figure 7.

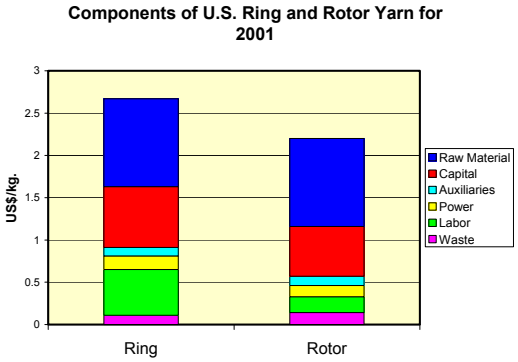

Figure 9: Components of Ring and Rotor Yarns for 2001 [3]

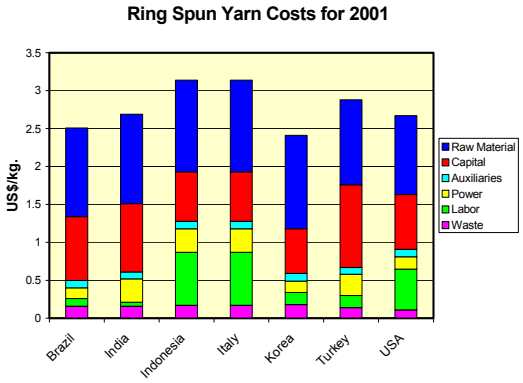

Figure 10: Ring Spun Yarn Costs by Country [3]

Raw material makes up the largest percentage of yarn costs for both types followed by capital and then labor. Not surprisingly, ring spun yarns have a higher percentage of labor costs than do rotor spun yarns. This is most likely due to the extra processes and oftentimes manual doffing. Also, ring spun yarns require more capital and power and produce more waste. This figure still does not show why cheaper, imported yarns have such a damaging effect on the U.S. spinning industry, if labor costs make up such a small percentage of total yarn costs.

In order to evaluate the reasons for the difference in international yarn prices, a comparison of the components of different countries' yarn costs needs to be analyzed. The manufacturing components for ring spun yarn are shown in Figure 10.

The chart proves labor cost is not the main determinant of total ring spun yarn cost. Each country represented here produced similar amounts of waste, and had comparable power costs and auxiliaries. The main difference between countries was capital and labor costs. All countries had similar raw material costs (+/- ten cents). Surprisingly, Indonesia had the cheapest labor costs, but it also had the highest yarn cost. What offset the low labor cost was the high capital costs. This goes to prove that labor does not always have a strong influence on yarn cost; it more so depends on every component put together. Figure 11 shows the same components of rotor spun yarns for the same countries.

This chart shows very similar trends when compared to the previous chart. Again, Indonesian yarn is the most expensive, even though that country has the lowest labor cost. One interesting observation here is that the three countries with the cheapest labor costs, Indonesia, Turkey and India, produce the most expensive yarn. Also, these same three countries also have the highest capital costs, which, in turn, offsets the low labor costs.

Effect of Labor Value

In all of the debate surrounding recent changes in trade agreements, labor in the U.S. has been very much in the center. The previous section on the effect of spinning systems indicated that despite normal expectations, labor does not have the strongest impact on total yarn cost. Other factors, such as raw material cost and capital cost, play just as large of a role, if not bigger, in the final manufacturing cost.

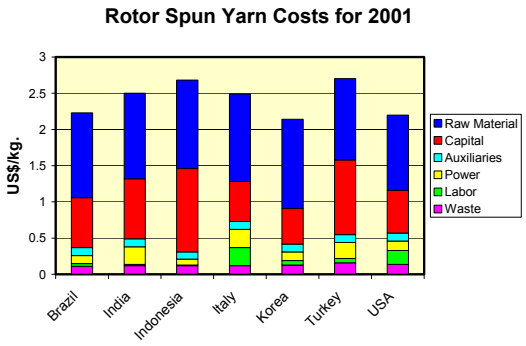

Figure 11: Rotor Spun Yarn Costs by Country [3]

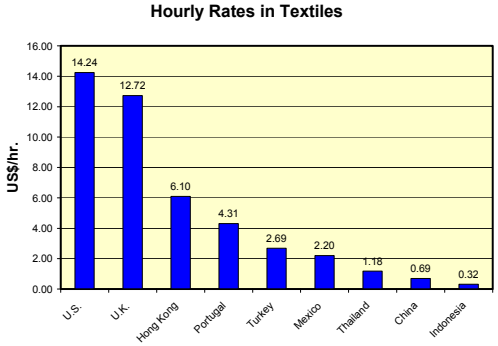

Figure 12: Hourly Rates in Textiles [6]

International Wages

Many articles published about the current situation in the textile industry mention how cheap imports have hurt the U.S. textile industry. These articles state that the inexpensive wages of these countries are what have allowed them to import their products at a much lower price when compared to U.S. products, even though the previous section proved this not to be fully true. Figure 12 shows the average hourly wages in the spinning industry from countries around the world, including the U.S.

This chart shows that the U.S. and the U.K. have considerably higher wage rates than other countries listed here. Indonesia has the lowest, but shown in Figures 10 and 11, Indonesia also has a comparatively high end yarn cost. China also has a very low wage rate, although data for other manufacturing costs from China was not available to be studied. One possible reason for there being such an abundance of cheap imports, since it is not solely dependent on wage rate, is that these countries might be taking a lower profit in order to be able to compete. It has been claimed that China was selling their products below cost during the Asian financial crisis in order to make any money at all. [4] This could be true of other countries as well.

One further important aspect to consider is the productivity rates of these countries. More and more domestic textile manufacturing is moving from the U.S. to Mexico and the Caribbean, but even though the wages are less, the productivity may not always be as high as in the U.S. Figure 13 shows the labor productivity for five countries, including the U.S.

This figure shows that the U.S. is significantly more productive than Mexico or the Caribbean. The U.S. is also more productive than India and China, as well as Turkey. Additionally, with sophisticated automated machinery, such as is found in a modern spinning mill, it is necessary to rapidly recoup the money invested by utilizing the machinery efficiently. This means that **ideally** a spinning mill should operate 24/7 (24 hours a day, 7 days a week) with a short scheduled annual stoppage for maintenance, etc. This also means that to make best use of the investment, the number of people employed should be minimal. Thus, the machinery must be run efficiently, but looking at Figure 13, this is not the case for overseas operators. The U.S. is significantly more productive than the countries shown in either Asia or Mexico/CBI. One critical aspect, which is not examined in this paper, is the hours worked per year by these countries. This

would have a significant impact on the productivity levels, as well as total labor cost [5].

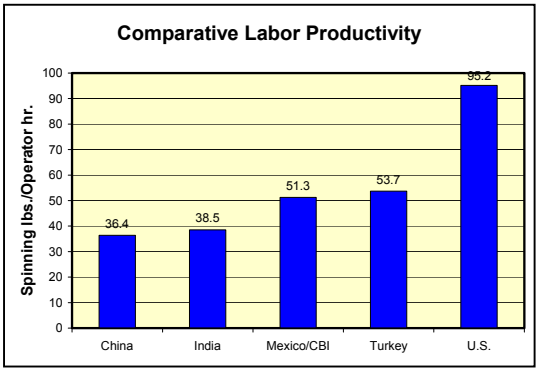

Figure 13: Comparative Labor Productivity [7]

Figure 10 showed the cost components of ring spun yarn compared to the U.S. India produced this type of yarn cheaper than the U.S., but Turkey produced yarn with a higher final cost. In some cases, such as with Turkey, the low wage rates might not be able to offset the lower productivity rates. This could be the reason why certain countries with a lower wage rate than the U.S. might have a higher final yarn cost. The authors are, however, unsure whether these considerations (mill operating hours and manpower efficiency) are included in the model used to generate the results presented in Figures 10 and 11.

It is hard to make any precise conclusions using only the data shown in this paper. There are still many unknown factors, which would have a considerable impact of yarn production costs, such as total hours worked per year. But, by examining the available data in relation to the data from previous sections, certain assumptions can be made. First of all, it has been proven that labor is cheaper overseas. But, as shown Figures 10 and 11, U.S. total yarn production cost is not always higher than these countries, as would be assumed. One explanation could be that machinery is cheaper in the U.S. than in these overseas countries. The reason for this is that the U.S. currency is stronger than these other countries, and therefore, the U.S. would receive a much lower interest rate. As proven in these charts, capital makes up a much larger portion of total cost than does labor.

Secondly, the producer determines how all of these factors are integrated into a total yarn cost, and since there is not universal standard costing, it is hard to compare which countries are able to produce yarn with the lowest overall cost. Also important is the fact that it is not known how much of a mark-up yarn manufacturers make on their final yarn selling price. It has been stated earlier that China sold products below cost in order to stay in the market during their financial crisis. This could also be true of other countries.

What this goes to show is that it might not always be less expensive to produce yarn in countries with cheaper labor. Currently, this has been a major issue for U.S. yarn manufacturers due to NAFTA, the Trade and Development Act and the WTO. In much of the research examined, many analysts stated that the only way for the U.S. to compete in the years to come was to move production overseas. For some textile industries, which are labor intensive, this is true. But, for spinning, this might not be the most economical solution. The main reason for moving spinning to Mexico and the CBI is not lower labor costs, but transport costs. U.S. yarn producers could save money and keep clients by having their production close to their customers. This still does not change that at some point something will have to be shipped, whether it is cotton, yarn or fabric.

Future of the Spinning Industry

It is hard to determine the exact path that the industry will take due to the changes constantly taking place, such as advancements in speed and automation. There is the new Vortex spinning, which unlike air jet can spin 100% cotton yarn. Whereas air jet produces yarn at 250 to 300 meters per minutes, Vortex operates at 350

to 400 meters per minute. Once this system becomes mainstream, it will result in many changes for the yarn production industry. Table 1 illustrates the production rates of each spinning type compared to the others. This table assumes each spindle is producing the same count yarn. For example, a rotor can produce the same yarn 7.5 times faster than a ring spindles. An air jet can produce yarn 13.75 times faster, and a Vortex can produce this yarn 18.75 times faster.

Table 1: Productivity Comparisons for Spinning Systems

	Rotor	Air Jet	Vortex
Ring	7.5	13.75	18.75
Rotor	N/A	2.0	2.7
Air Jet	N/A	N/A	1.1

In addition to the advancements being made in spinning technology, there are also unforeseeable trends. Currently, there is a trend favoring the use of ring spun yarns over rotor spun yarns. This, of course, is likely to change, as are most trends of this type. In 2005, the textile industry will see a reduction in tariffs and an elimination of quotas. It is impossible to accurately predict what effect this will have. Many of the articles researched for this paper believe that moving production facilities off-shore is the only way to survive the surge of imports which will definitely occur in 2005. But, as shown in previous sections, labor does not have as significant an impact on yarn price as expected. Also shown is that the productivity of these other countries is not a high as that of the U.S. Therefore, it is safe to say that moving spinning production would not be very wise economically. However, one profitable reason for moving production is to save money on transportation costs. There is no doubt that labor intensive textile industries will have to relocate, but spinning is not considered necessarily labor intensive. Therefore, if yarn production remains in the U.S., the yarn will have to be transported. But, there is still no way to avoid transportation costs somewhere along the way, since relocating yarn production necessitates transport costs for fibers.

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