2 Yarn Manufacturing in China

2.1 PRODUCTION CAPACITY

China is a large denim yarn producer and consumer. Based on information from USDA [1] and the Statistics Bureau of China [2], China consumed more than 21.4 million bales (bale size 480 lbs) or 24 per cent of total world cotton consumption in 1996-97 [3], and one-fifth of total Chinese cotton consumption was used by the denim industry. The Chinese denim industry consumed about 5 per cent of the world's cotton in 1997 [1].

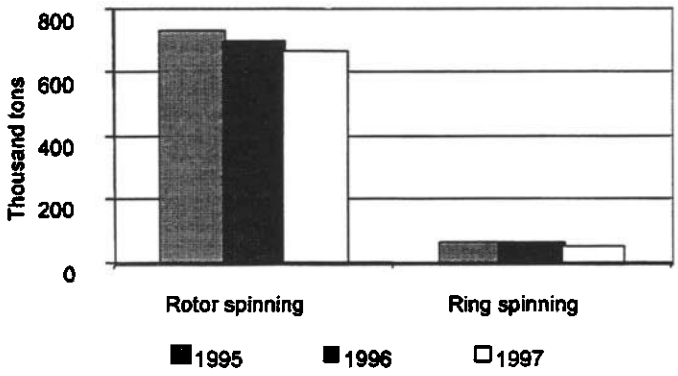
In China, denim yarns are mainly made by rotor spinning and ring spinning. China has 8.4 per cent of global rotor spun yarn production capacity, with 600,818 spindles of rotor spinning in 1995. This peaked with 603,619 spindles in 1996, but fell to 572,500 spindles in 1997. China produced 701,593 tons of rotor spun yarn in 1995, 742,300 tons in 1996 and 708,050 tons in 1997 [1].

Rotor spun production is distributed across 28 provinces in China. In the past few years, the distribution of Chinese rotor spun production has shown three trends: a move to cotton-production areas, a shift to west-middle areas and a move away from big cities to small towns.

2.2 ROTOR SPINNING AND RING SPINNING PRODUCTION

Denim yarns are mainly made by rotor spinning and ring spinning. More than 90 per cent of denim yarn produced in China is by rotor spinning. In 1995, 727,000 tons of rotor spun yarns were consumed by the denim fabric industry, with 698,000 tons in 1996, and 662,000 tons in 1997. (See Fig. 2.1)

Ring spinning accounts for around 7 per cent of the denim yarn production in China. The denim fabric industry consumed 63,000 tons of ring spun yarns in 1995, reaching 65,000 tons in 1996, and falling to 50,000 tons in 1997, a decrease of more than 23 per cent. (See Fig. 2.1)



2.1 Denim yarn consumption in China

Fancy yarns have only a small share of the denim yarn market in China, accounting for less than 1 per cent of China's denim yarn consumption in 1995-1997. There was, however, some evidence indicating that fancy yarn, drum spinning, core-spun and fancy slub yarns were getting popular as the weft yarn of denim fabric as these fabrics were being welcomed in the market. The market for fancy yarn in China can therefore be expected to grow. (See Fig. 2.1)

2.3 DENIM YARN CONSUMPTION

The Chinese denim fabric industry consumed 790,000 tons of yarn in 1995. The volume fell from 763,000 tons in 1996 to 712,000 tons in 1997.

In China, about 86-90 per cent of denim rotor spun yarns were pure cotton, 6^s to 8^s. Two to 3 per cent of denim rotor spun yarns were 6^s and 14^s linen/cotton; 1.5 - 2 per cent of denim rotor spun yarns were polyester/cotton and silk/cotton; 3 - 4 per cent were 8^s and 21^s pure cotton of ring spun yarns; 2-3 per cent were ramie/cotton yarn; and 1.5 - 2 per cent were polyester/cotton and silk/cotton yarn.

2.4 PRODUCTION BY REGION

The following analysis covers rotor spun production by region in China, as rotor spinning is the most important system of denim yarn production in China. Important rotor spun production areas included Shandong, Jiangsu and Hubei Provinces, as shown in Figure2.2. Shangdong produced 127,000 tons of rotor spun yarns in 1997, Jiangsu 127,000 tons and Hubei 106,000 tons. The sum of the production these three provinces accounted for 44 per cent of China total rotor spinning output.

Shandong was the most important rotor spun product base in China, accounting for about 18 per cent of China's total rotor spinning output in 1997, though its fell from 144,000 tons in 1995 to 127,000 tons in 1997. Shandong has developed more than 100,000 spindles of rotor spinning machines in the past ten years, distributed mainly in Qingdao, Jinan, Zhibo and Weifan. (See Fig. 2.2)

Jiangsu is the second most important rotor spinning production area in China, and has established 90,000 spindles of rotor spinning machines in the past decade. Its output was 119,000 tons of rotor spun yarn in 1995, 116,000 tons in 1996 and

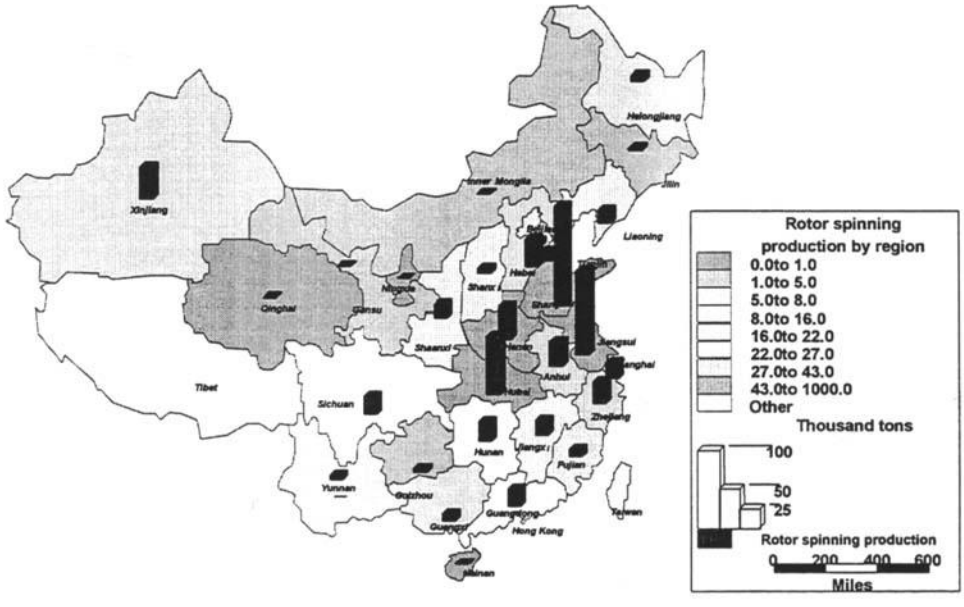
106,000 tons in 1997, accounting for about 15 per cent of China's total rotor spun yarn output in each year. (See Fig. 2.2)

Hubei Province is the third important rotor spun production area in China and its production has remained steady. Hubei produced more than 75,000 tons of rotor spun yarn in 1997, accounting for 11 per cent of China's total rotor spun yarn output. (See Fig. 2.2)

The provinces of Henan and Xingjiang each produced 6 per cent of China's total rotor spun yarn output in 1997. Heibei province accounted for 5 per cent of national rotor spun yarn production, while the other rotor spun producing provinces accounted for the remaining 39 per cent of China's total rotor spun output in 1997. (See Fig. 2.2)

2.5 MACHINERY

The rotor spun machinery used in the Chinese denim yarn industry could best be described as being "second class". About 62 per cent of the machinery has been made in China and includes the following models: FA610A, FA611, 622A, Fa621B, F1602, CR2 and TQF1. Each of these has 190-230 spindles, 40,000-80,000 revolutions per minute, and a cheese weight of above 4kg. About 38 per cent of the machinery has been imported and includes the following models: AUTO288, RI, FRS, BDA-202, and BD-DI. Compared with the equipment made domestically, the imported ones have larger cheeses (4-6kg), faster ring speeds (40,000-130,000 revs per minute), more spindles, stable production quality, greater output, and can produce a wider range of products.



2.2 Rotor spun production in China

2.6 CONTAMINATION

The hot and strongly colored textile-dyeing wastewater is notoriously known to contain a large amount of suspended solids, high COD (Chemical Oxygen Demand) concentration and a highly fluctuating pH. Dyeing of denim yarn with indigo can be a significant source of wastewater problems. The contamination from denim dyeing arises principally from oxidized Alkali, which was used in the dyeing process. The indigo effluent in the denim washing process is the major pollutant of the colored wastewater. To minimize contamination in the denim process is an important project for the denim producer. Thus the recovery of indigo and pH control has been applied in the denim process.

In addition, contamination also arises from denim washing. To make the denim apparel soft and to create different effects, stone washing, enzyme washing, bleach washing, Ice washing or snow washing is applied. This process produces a variable-pH wastewater of considerable organic strength that contains high levels of color.

In the developed countries, such as the USA, and the Europeans countries, there are strict laws to regulate the treatment and discharge of the wastewater from the textile dyeing and washing sector. The Chinese denim dyeing sector invested little on wastewater treatment at the beginning of the industry's-development. The low requirement for wastewater treatment attracted much foreign investment to the Chinese denim sector. China introduced wastewater control regulations in the 1980s; however, the regulations were paid little attention and only a small proportion producer adopted centralized treatment to minimize pollution of the wastewater. To save the costs on wastewater treatment, many manufacturers discharged the wastewater with little treatment. This has posed serious pollution problems in the Chinese coastal areas, where the Chinese textile industry is concentrated.

2.7 POLITICAL AND STRATEGIC SIGNIFICANCE OF DENIM YARN MANUFACTURING

2.7.1 Cotton distribution system reform

The cotton distribution system before 1999

China is the world's leading cotton producer and at the same time, the world's leading cotton consumer, accounting for about a quarter of the world's total output and consumption [3]. China's cotton output is largely absorbed by the domestic textile industry. Cotton is the most important raw material for the denim industry.

The textile industry is one of the pillars of the China economy, as the leading foreign currency earner. To support the textile industry, the government kept control of the cotton supply in order to support the textile industry. Over a long period, the cotton supply was under a central plan, and the state was the only buyer of cotton. Cotton distribution and price were controlled centrally, even after China carried out its agriculture reform in 1978, when most kinds of agricultural production were released from state.

The China cotton supply system (Fig 2.3) was controlled by the China State Council, which determined the uniform state cotton purchasing price. The

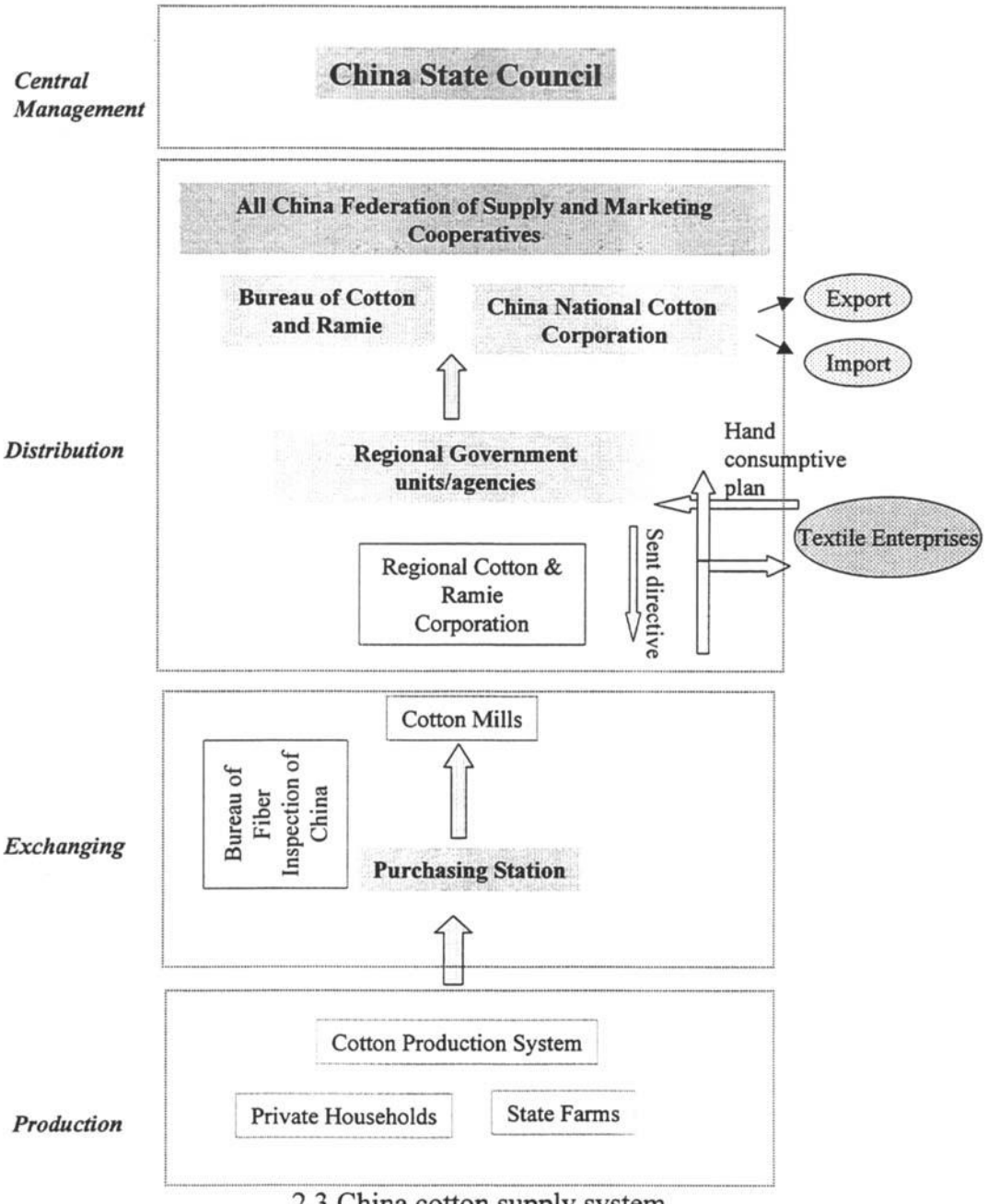
Government agency, the All China Federation of Supply and Marketing Cooperatives, was the single channel of cotton distribution. Cotton producers (private household or state farm) sell cotton to a purchasing station, which was deputized by the regional Cotton & Hemp Corporation, a regional government agency, subordinate to the regional Supply and Marketing Cooperatives. In the purchasing procedures, the cotton price was determined by the cotton quality, which was classified according to the national standard made by the Bureau of Fiber Inspection of China. The cotton was then sent to a regional cotton mill to gin and pack, before being distributed to textile enterprises by the regional Cotton & Hemp Corporation. The textile mills were required to submit their cotton consumption plans to the Cotton & Hemp Corporation of their province as a foundation for making a cotton-supply plan. The Corporation would then send a directive to the sub-Corporation to distribute the cotton to the mill following the plan.

Chinese cotton imports and exports are mainly arranged by the China National Cotton Corporation, a subordinate of the All China Federation of Supply and Marketing Cooperatives. It is the most important channel for cotton imports and exports in China. There are also some enterprises that enjoy a license import or export cotton, but in terms of the volume and value, the exports/imports were relative small compared with those of the China National Cotton Corporation.

The Chinese cotton system has undergone changes. At the start of the 1980s, a state procurement system was put in force. Cotton planters had to meet a basic quota. Any over-quota output was offered higher prices. The provision of chemical fertilizers and insecticides were applied as tools to encourage planting more cotton. In the middle of the 1980s, China's cotton production and net exports reached their peak, and production exceeded domestic consumption in the 1984. Accompanying this need sufficient supply of cotton cause economic reforms by which the government tried to liberalize the cotton supply. The cotton marketing arrangement was first adjusted by the government so as to shift the relative returns away from cotton mills to other crops. A second adjustment occurred in 1985, when the state procurement system was replaced by contract purchase, which was less restrictive on price and distribution channels. As the state offered lower purchase prices, cotton producers switched to grain, because the price of grain rose relative to cotton.

When producers reduced their cotton planting, the Chinese cotton processing capacity boomed in the following years. The cotton production system couldn't meet the domestic textile industry demand, and the market price for cotton surpassed the plan price. Cotton producers refused to supply raw cotton at the state-planning price without receiving rewards, such as foreign exchange, low-cost debit funds, or fertilizer. The quality of raw cotton also declined, and for example, adulteration and shorter fiber lengths were reported. In 1989, the China State Council announced all that raw cotton should be sold to the state only. The state procurement system, which was abolished in 1985, was reinstated.

A poor harvest of cotton in China during 1993/94, after a bad year in 1992/93, influenced world cotton supply prices, especially in the China domestic cotton market. China had to import cotton and increase the government purchase price. The price of cotton in the Chinese domestic market was US50cents/1b in April 1994, considerably lower than prevailing world prices [4]. In December 1997, the price in the Chinese domestic market was US$ 2100/ton in China, while the international



2.3 China cotton supply system

price was US$1600/ton. The domestic cotton price was nearly 25 per cent higher than the international market price [5].

The low price competitive advantage of Chinese textile products declined in the international market, due to the higher raw cotton price, the adulteration and shorter fiber length in cotton fibers. Enterprises tried to find lower price cotton in overseas markets, as some production enterprises enjoyed an open license to import cotton. China was the world's second largest cotton net importer in the 1997/98.

In long term, China's central government has a strict monopoly over all cotton purchasing, marketing, storage, and export. Chinese cotton textile mills have to face a single cotton supplier, a government specified company. In the past few years, the higher cotton price in the domestic market has had a negative impact on the denim yarn, fabric, and garment manufacturers, as they had to bear the burden of high raw

material costs, which eroded the Chinese cotton sector's competitiveness in the world market.

Cotton distribution system after 1999

In recent years, the Chinese State has purchased domestically produced cotton at a higher price, while huge amounts of low price cotton was imported by the cotton users who can enjoy their license to import cotton. The China cotton inventory reached a huge volume in 1998. On 13 January 1998, China's State Council decided to liberalize cotton prices from 1 September 1999 [6]. The government let free market forces influence its cotton market to improve management of resources, import and export policies and use of distribution channels. After liberation, instead of the state being the only buyer of cotton, other enterprises also can purchase, process, or deal with cotton. Of course, the enterprises should be qualified as to sufficient capital, quality control and inventory facilities and have adequately trained accountants and business managers who are able to widen their operations with seed processors, state farms, textile enterprises, and agricultural departments. The officially fixed price is replaced by a "reference" price. This means that the cotton price will be determined by market forces instead of the state imposing a uniform price around the country. If things get out of hand, the government may step in and exert administrative authority over prices by its holding inventory. At the same time, textile enterprises and textile products exporters were encouraged to purchase cotton at the basic level from the Supply and Marketing Cooperative, the Cotton & Hemp Corporation and cotton mills, via a delegate or agency.

The cotton price gap between the international market and the Chinese domestic narrowed in the second half of 1999. Information given by a Chinese official [7] stated that the price of cotton textile products declined in 1999 because of cotton price liberation. China became the world's fifth largest net exporter in the 1998/99.

The cotton supply system reform largely benefited the Chinese denim yarn industry with a substantial price decrease and increasing flexibility of raw material selection. The liberation of the cotton supply also influenced the down stream industries i.e., the denim fabric and apparel industries, to buy raw material at prices unavailable to the international market. This will increase the competitiveness of the Chinese denim industry in the markets.

2.7.2 China textile industry reformation

Textile industry restructuring

The Chinese textile industry is characterized by a massive labor force, prevalence of obsolete machinery and equipment, and low productivity. The industry has fast expanded in the last two decades. However, much of the investment was duplicated. The output was improved, but the products' added-value was low. The industry faced a low profit margin with high costs. To modernize its textile industry, the Chinese government planned to restructure the industry by eliminating spindles, downsizing the workforce, and improving efficiency. The restructuring effort was made in order to reduce oversupply of the textile sector and upgrade the industry. From 1991, the Chinese government announced a plan to dismantle 10 million spindles (ring spun) about a quarter of the national total. With the dismantling of the spindles, huge

about a quarter of the national total. With the dismantling of the spindles, huge number of textile worker (1.2 million) would also be laid off. The government was determined to introduce modern techniques and upgrade the quality of products through the restructuring. However, the plan has not been fulfilled. The spindle numbers did not reduced significantly. In 1998, the China State Council announced a further restructuring of the textile industry with clear objectives, including the elimination of 10 million spindles, the layoff of 1.2 million worker, and diminution 6 billion RMB losses.

As one of the oldest industry in the China, textile industry has huge over-employment. Before 1978, workers were assigned permanent jobs. Enterprises not only paid the workers a salary, but also provided welfare, such as housing, pensions, medical insurance, and child-care. It was a huge burden to the industry. Most importantly, the over-manning prevented the enterprises from operating efficiently, because of workers lack of incentive, sluggishness and slackness during working hours, as they had permanent jobs. The government allowed lay off of 120 million employees, and gave enterprises more autonomy on employment to reduce the burdens.

In 1998, China cut 5,120,000 spindles and laid off 660,000 textiles workers. Up till October 1999, 7,500,000 spindles were dismantled [8]. However, the additional spindles it planned to be cut in 2000 are mostly new and running at full capacity. A majority of them are in mills in interior areas that economically lag behind other parts of the country. The laid-off textile workers will increase unemployment pressures in these areas [8].

The launch of restructuring brought improvements to the Chinese textile industry, the working efficiency was improved, and the raw material was better utilized after the out-modern spindles were smash. The industry operated more healthily, especially the State-Owned sector, with loss reductions in 1999. The major challenge facing China's textile industry is to improve efficiency and to achieve run market-oriented profit-generation. Specific challenges include training the unskilled labor pool, finding or raising capital for investment in advanced technology, and finding jobs for the unemployed in the midst of restructuring.

The denim yarn sector was relatively young compared to the rest of the textile industry. As mentioned in section 2.2, 85 to 92 per cent of China's denim yarns are rotor spun, ring spinning playing little part in China's denim yarn consumption. Most of machinery was invested after 1980, 62 per cent being domestic made, and the rest imported. The restructuring of the China textile industry focused on the ring spinning sector, most of whose machines were introduced in the 1950s. So, the production capacity of denim yarn will not be reduced by the plan to eliminate spindles.

The implication of the restructuring of the denim yarn sector was that spindles reduction would decrease the conflict between cotton supply and demand. The cotton would be better used in China textile industry. The denim yarn sector, as an important cotton user, will face less pressure from the cotton supply. The restructuring also improves the efficiency of the whole textile industry by laying off superfluous employees. In the end, the Chinese denim sector should be benefit from the efficiency improvement of the whole Chinese textile industry.

SUMMARY

China is a large denim yarn producer and consumer. Its manufacturing bases are

mainly distributed in the provinces of Shandong, Jiangsu and Hubei. A high proportion of the denim yarn is made by rotor spinning.

Although China is one of the leading cotton producers, its textile industry's demand exceeded supply in the last few years. The unbalanced cotton supply troubled the denim yarn producers, especially with the strict monopolistic cotton distribution channels, and with the problems such as unstable cotton production, and fast growth of downstream processing capacity, the Chinese denim industry faced scarcity of raw material supply. The Country Council announcement of liberation of the cotton supply will introduce market forces into the industry and benefit the denim producer in terms of flexibility on cotton sourcing. Meanwhile, the national textile industry reformation will improve the efficiency of the whole textile industry and with it the denim yarn sector.

REFERENCES

1. Cotton Incorporated, *U.S. Cotton Market*, 1998, U.S. Cotton Incorporated. www.cottonincorp.com
2. China statistical Bureau, *China Denim Market Research Report.*1998, China Statistical Bureau, Beijing.
3. Cotton Incorporated, *U.S. Cotton Market*, 1998, U.S. Cotton Incorporated. www.cottonincorp.com
4. Glasse, J., *Textiles and Clothing in China*, 1995, The Economist Intelligence Unit.
5. Leung, P., *The coming year for cotton.* Textile Asia, February 1998: p. 69.
6. China Economic Information Center., *Cotton sector to become market-wise next year*, . 1998, http://www.cei.gov.cn/.
7. China State Council Development Research Centre, *China Textile Marketing Trends Analysis*, . 1999, http://www.drcnet.com.cn.
8. China Textile Bureau., *Instruction on Spindle-dismantle and Suspension of Newly-added Production Capacities*. 1999: Beijing. http://www.ctei.gov.cn/cteitz.htm.