Trends in Chinese paper producers and trade

A GRADUATING ESSAY SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF BACHELOR OF SCIENCE

In

The Faculty of Forestry

Forest Resources Management

THE UNIVERSITY OF BRITISH COLUMBIA(Vancouver)

Qinglong Shi
2013/3/26
ABSTRACT

The Trends in Chinese paper producers and trade is a comprehensive analysis on the Chinese paper industry developments, and the policy driving them. There will be two primary parts: wood pulps and paper and paperboard. Wood pulps will be divided to mechanical, chemical and dissolving grade pulps. Paper and paperboard will include printing and writing papers, packaging materials, household and sanitary papers. Because of the recent rapid development of China, and improvement in the standard of living in China, Sanitary and household paper offer a huge potential market in China. There are the excessive production of high grades writing and printing paper in China, which forces producers to seek more export opportunities to sell their products. The Chinese market demand in Wrapping and package paperboard changed substantially from 1961 to 2011. As the consumption of packaging paperboard indirectly reflects the levels of social development and economy, during the period where the Chinese GDP per capita will increase from 3,000 USD to 11,000 USD, the average consumption should also increase stably and reach 100kg in 2016, and finally reach 150kg in 2020. Mechanical wood pulp is obtained by grinding or refining residues into fibers, the technology for producing mechanical pulp for printing paper has not changed much since 1980. Most improvements in technology have been in screening operations. Dissolving wood pulp is made from wood of special quality, with more than 95% alpha-cellulose content and the production is limited by the resource. Since cotton farmland has not increased and the production will not change much in the future, choice of raw material is limited to wood and bamboo. China consumes a substantial amount of chemical pulp. Canadian wood pulp has been used for the longest time in China since it has consistent quality while there are some new competitors. Brazil and Chile have been producing kraft pulp at increasing rates with the lowest cost in the world.

KEYWORDS

Paper and paperboard, Wood pulp, Consumption, China, demand, production
# TABLE OF CONTENTS

**ABSTRACT** ........................................................................................................................................... 2

**KEYWORDS** .............................................................................................................................................. 2

**TABLE OF CONTENTS** ............................................................................................................................... 3

**LIST OF FIGURES** ...................................................................................................................................... 4

- Introduction ..................................................................................................................................................... 5

- Sanitary and household paper ........................................................................................................................ 5

- Printing and Writing paper ............................................................................................................................. 8

- Wrapping and Packaging Paperboard ........................................................................................................... 10

- Mechanical Wood Pulp .................................................................................................................................. 13

- Dissolving Wood Pulp .................................................................................................................................... 15

- Chemical Wood Pulp ..................................................................................................................................... 16

- Conclusions .................................................................................................................................................... 18

- Reference ....................................................................................................................................................... 19
LIST OF FIGURES

Figure 1: Household and Sanitary Paper in China .......................................................... 6
Figure 2: Quantity of Wood Pulp Imported by China ....................................................... 8
Figure 3: Printing and Writing Paper in China ................................................................. 9
Figure 4: Wrapping and Packaging Paperboard in China ................................................. 11
Figure 5: Mechanical Wood Pulp in China ..................................................................... 13
Figure 6: Dissolving Wood Pulp in China ....................................................................... 16
Figure 7: Chemical Wood Pulp in China ....................................................................... 17
Introduction

The *Trends in Chinese paper producers and trade* is a comprehensive analysis on the Chinese paper industry developments, and the policy driving them. Besides an analysis of the Chinese paper industry, this essay will also include an assessment of the major trends on global paper producers and trades of pulp and paper products and paper board between China and other countries. The study will develop a trade flow map between China and other countries and use formula (Apparent Consumption = production + import – export) to calculate consumptions of wood pulp and paper and paperboard in China. Wood pulps will be divided to mechanical, chemical and dissolving grade pulps. Paper and paperboard will include printing and writing papers, packaging materials, household and sanitary papers. Trading countries will primarily focus on the United States, Canada, Scandinavia, Russia and other countries. The primary source of statistics used for this analysis is the FAO and UNECE. Once the apparent consumption charts have been established, the difference in quality, price, manufacture location and products composition will be evaluated.

Sanitary and household paper

Sanitary and household paper is an important part of society and can reflect the standard of living of an individual. It covers a wide range of tissue and hygienic paper products for household use or commercial and industrial uses. Generally, people in developed countries consume more sanitary paper than people in developing countries. Because of the recent rapid development of China, and improvement in the standard of living in China, these products offer a huge potential market in China.

Before 1992, over 95% of Chinese sanitary paper was toilet paper and less than 5% was tissue paper. With improvements in the standard of living, about 11.5% (410,000 tons) of the current Chinese market share is tissue paper and 85.5% (3,064,000 tons) are toilet paper by the end of 2007. Napkins
and kitchen paper consists of 2.7% (53,000 tons) left. Among tissue paper, facial tissue consists of 61%; pocket tissue consists of 39% (19). In contrast, the global sanitary and household paper market in 2000, toilet paper only occupies 56% and pocket tissue occupies 21%, with facial tissue and napkin consisting of 12% and 11%, respectively (1). Chinese consumption of toilet paper in 2007 consisted 29.5% larger than global average consumption of which in 2000. Since toilet paper is considered as a household necessity not a household improvement, we can infer that the consumption of Chinese sanitary paper has not reached the average level of global consumption and Chinese’s hygienic standard is at a low level. Moreover, figure 1 shows that after 1984, there is a dramatic growth in domestic production and consumption from 0 to 7,500,000 tons.

![Household and Sanitary Paper in China](image)

**Figure 1: Household and Sanitary Paper in China**

Reference: FAOSTAT

However, there is almost no import or export of sanitary paper. Domestic production supplies the domestic consumption. This however, does not imply that there is no opportunity for foreign producers, since sanitary and household paper is usually made of high quality wood pulp. Although China has substantial forest resources, forest storage per person which means total forest cover and volume divided by the population is still low. Before 1999, the natural Chinese forest supplied most of the Chinese timber resources. However, the timber supply is steadily decreasing since the Forest Law of the People’s Republic of China (Revised Edition) which conserves natural forest came out in 1998 (17). It has been forecasted that in 2015, the total timber consumption will be about 480 million m$^3$. 
and the domestic timber supply can only supply as much as 290 million m$^3$. The 190 million m$^3$ shortfall needs through import (2). Figure 2 nicely illustrates the increased import of lumber from foreign sources. Since tissue is usually made of virgin fibre and there is a domestic timber shortage, China continues to and will need to likely increase wood pulp from other countries. It is also apparent that China imports most of its wood pulp from Canada, which was 2,604,000 tons in 2010, while USA ranks second, and Indonesia third with 2,097,000 and 1,234,000 tons, respectively. Canada has an advantage in wood pulp over the USA, since it has greater forest resource than USA. Even the US industries have come to rely on Canada for stable, predictable access to quality products and it has been the subject of disputes for many years (3). As a neighbor country of the USA, the United States does not have any significant advantage over Canada with respect to pulp products since Canada is able to produce northern bleached softwood kraft (NBSK) which is the highest quality pulps while the US is only able to produce lower quality wood pulp like the southern softwood pulps and the southern hardwood pulps. Indonesia used to be China’s biggest wood pulp exporter. However, rapid deforestation is so severe in Indonesia that 20% of the forest area has been lost between 1990 and 2010 (4). Moreover, the Indonesian government signed an agreement which is a 2-year moratorium on new concessions in primary natural forest and peat land areas (5). As a result, Indonesia is not expected to export wood pulp in the long term.
Although Canada is the largest importer in terms of wood pulp, the quantity only takes up 27.9% of the total quantity of the top five importers, and there is substantial opportunity for future growth for Canadian producers to develop greater business relations with Chinese wood pulp business to satisfy China’s rapidly developing market of sanitary and household paper.

**Printing and Writing paper**

Printing and writing paper grade includes writing paper, copy paper and paper which is used for magazines, books and brochures, and occupies approximately 30% of global paper consumption. Specifically, the global average consumption in printing and writing grade paper is about 18kg per person (6). However, this varies substantially by country. Among them, North American consumes 106kg per person. Japan consumes 92kg per person, while China only consumes 7.3kg per person. Writing and printing paper grade is traded globally and 55% of it is in the form of uncoated paper derived from mechanical wood pulp. The remaining 45% is coated paper mainly made of mechanical
wood pulp and they form the major trade flow from the Northern Hemisphere to the Southern Hemisphere. In contrast, international trade of printing and writing paper based on chemical wood pulp is lower than that of mechanical pulp and only 17% of uncoated writing and printing paper associated with 30% of coated writing and printing paper based on chemical wood pulp is traded internationally (6). In figure 3 we can see that the consumption of printing and writing paper in China has risen steadily since 1993 and reached 23,687,468 tons in 2011. However, much of the demand has been satisfied by domestic production and as the production. A small fraction is exported, which as risen to 2,920,652 tons in 2011. However, there has also been a small percentage of import of printing and writing paper.

![Printing and Writing Paper in China](image)

**Figure 3: Printing and Writing Paper in China**
Reference: FAOSTAT

Trends in the markets of writing and printing paper will be determined by several factors. The first is to satisfy new applications of paper, which depends on the development of society and the technology level of paper manufactory. For example, copy paper made with a mixture of recycled fibre and virgin fibre can be developed to reduce waste and improve recycle rate. The second one is to develop new paper products to meet various demands of people and currently we can see many new categories of paper being used in the market. For instance, there is a new writing paper called green recycling writing paper the ink on which can be erased for hundreds of times to save paper. The third is to improve the properties of paper such as whiteness, and reduced paper weight.
Whiteness can improve contrast and enhance printing results, while lower paper weight employs less natural fibre and concurrently lower transportation costs. As for the last trend, it is efficient to improve raw material and therefore to improve the usage of waste paper and coating (6). If the quality of raw material is improved, more waste paper and less coating material can be applied to the manufactory as long as the quality standard is met and thereafter to save resources.

Figure 3 illustrates the decreasing import of printing and writing paper in China since 2000 and an increasing export of the paper. Reasons behind these are the excessive production of high grades writing and printing paper in China, which forces producers to seek more export opportunities to sell their products. More than that, some Chinese producers reduce their production capacity of uncoated paper and transfer the capacity to coated paper which has better markets (7). This situation, substantially influence the trade flow in Asia, since China is such a big producer. In the beginning of 2005, most of the export went to Hong Kong and Japan. Some producers started exporting to India, Singapore and Indonesia. At the meantime, export of printing and writing paper to the North America increased dramatically and some went to Middle East and west European markets (18).

**Wrapping and Packaging Paperboard**

Wrapping and package paperboard is a major paper products, which includes paperboard, corrugated paper, white board and white paperboard. The Chinese market demand in this paper category changed substantially from 1961 to 2011. Before 1984, the consumption of wrapping and packaging paperboard remained stable and relatively low, which is around 80,000 tons per year. Most of the demands came from import during that period. Since 1984, export remains at about 2,000,000 tons per year and import declined slightly from 5,023,835 tons in 2000 to 2,506,046 tons in 2011. In contrast, the production increased sharply, with production and consumption reaching 62,331,000 and 62,657,641 tons in 2011, respectively.
From this, we can infer that the domestic production meets most consumption. The largest 34 wrapping and packaging producers in China have a total production capacity of 26,490,000 tons, which occupy 46% of the overall domestic production, while over 50,000 small wrapping and packaging producers only occupy less than 40% market share. This data also illustrates that the Chinese wrapping and packaging paper industry is moving to be more concentrate, since the paper industry relies heavily on economies of scale, which means bigger producers are able to offer products with lower cost. Bigger producers are more competitive and smaller producers will become less due to less competitive. The total number of wrapping and packaging producers will become less in the future with increasing number of big producers. The biggest two packaging paperboard producers in China are Nine Dragons Paper Limited and Lee & Man Paper Manufactory Ltd., with annual production capacity of 7,850,000 and 3,300,000 tons, respectively. The price of wrapping and packaging paperboard has fluctuated during recent years, which is due to integrated factors, including price of raw material, market demand, cost of production and product quality (8).

The consumption of packaging paperboard indirectly reflects the levels of social development and economy, as most market products like household appliances, foods, liquor need packaging and most of them are packed with paperboard. More paperboard production usually infers more production of other industries and vice versa. As a result, packaging paperboard can be forecasted by GDP per
capita. When comparing between paperboard consumption and GDP per capita increasing from 2,500 USD to 10,000 USD within the US, Japan, Australia and South Korea, there is a close relation between average consumption of packaging and paperboard and GDP per capita. Based on this relationship, future consumption of paperboard can be forecasted in China. During the period where the Chinese GDP per capita will increase from 3,000 USD to 11,000 USD, the average consumption should also increase stably and reach 100kg in 2016, and finally reach 150kg in 2020 (9).

Although the corrugated paper market is developing fast, it still cannot satisfy China’s needs. China still imports corrugated papers to meet the shortage, the majority of which are derived from raw fibre. On the other hand, the raw materials (80%-90%) used to produce wrapping and packaging paperboard is derived from waste paper, which is easy to process with a low production cost. Although domestic production of waste paper is increasing annually, it cannot satisfy the production demand. Imported waste paper was 27,120,000 tons in 2009 and was 24,000,000 tons in 2010, due to shortage of resources and high price. Most of the world’s waste paper is sold to China, since waste paper can also be used into production of newsprint. As a result, the price of packaging paperboard is highly influenced by waste paper availability and price worldwide (8). In the long term, as the reason mentioned above, the scale of packaging paperboard will keep increasing as well as the concentration of the industry. Also, the packaging industry serves for variety of industries, its market keeps changing and the paper board has to compete with other packaging material like plastic baskets, wood boxes or frames and foam boxes. In order to increase its competitive advantages, the properties of packaging paperboard must meet requirements from the packaging industry. It needs to have a better printing surface for higher packaging and display requirements, which are better for brand advertising and corporate image. Other than that, paper boards with higher stiffness and less paper weight need to be developed, since they have advantages like cheaper shipping costs and will produce less waste due to higher quality.
Mechanical Wood Pulp

Mechanical wood pulp is obtained by grinding or refining residues into fibers. It can be bleached or unbleached and includes chemi-mechanical and thermo-mechanical pulps. Figure 5 indicates that import increased slowly before 1998 and reached a peak at around 304,100 tons, and has since declined to 59,433 tons in 2011. In contrast, exports remained between 100 tons to 200 tons per year. No export of mechanical wood pulp existed before 1992. The production and consumption of mechanical wood pulp fluctuates with production and consumption peaking at 865,000 and 937,276 tons in 2008, respectively. Chemi-mechanical pulp (CMP) produces high bulk paper that displays good bending stiffness and opacity. It also has lower production costs than sulfate pulp as well as positive effect on formation and softness of paper.

![Figure 5: Mechanical Wood Pulp in China](image)
Reference: FAOSTAT

Currently, there are many CMP factories in China, and almost all the production lines are imported and have a production capacity of CMP over 100,000 tons. CMP production lines which are built or being built in China are either BCTMP process technology from METSO or PRC-APMP from ANDRITZ (10).

As for the mechanical pulp, the technology for producing mechanical pulp for printing paper has not changed much since 1980. Most improvements in technology have been in screening operations,
which has improved the quality of the mechanical pulp and fit them to high quality production of printing paper (11).

On the other hand, mechanical pulp has a great competitive advantage due to high cost performance, while there are still constraints on it. Since fierce competition between traditional media and electric media, printing industry has to improve production efficiency by lowering the cost. To achieve that, producers tend to employ wider and faster printing machines to increase production capacity. Mechanical pulps have shorter fibers and are less compatible with high speed production machines. The second constraint is the raw material. As different trees species (even different trees) have very different fibre properties, and it is well known that fibre characteristics have the greatest effect on properties of pulp. The properties of wood will therefore influence the choice of process technology and application. The final thing is the cost and supply of energy required for effective production. Mechanical pulping requires significant energy inputs, any fluctuations in energy price or supply will reduce the competitive advantage of mechanical pulp.

The mechanical pulp most commonly used by China is Bleached Chemi-Thermo Mechanical Pulp (BCTMP). The most popular brands are Quesnel, Ranger from WESTFRASER and Millerwestern, Fibreco from TEMBEC (15). China produces ivory board, newsprint and light-weight paper, as such, demands for BCTMP continue to increase. Some Chinese paper companies have recently invested in BCTMP production lines. This implementation of BCTMP in China is permitting a reduction in the use of wood and replaces bleached broadleaf chemical pulp to reduce cost. BCTMP has many advantages, improving thickness, stiffness and paper formation. However, paper made from BCTMP has a shorter service life, since BCTMP is prone to yellowing (15).

Last but not least, with constraints on mechanical pulp and depressing demand, there will likely be greater competitions. Producers have to improve energy efficiency and production capacity as well as quality control and waste water processing in order to survive in the global market (11).
**Dissolving Wood Pulp**

Dissolving wood pulp is made from wood of special quality, with more than 95% alpha-cellulose content and it is always bleached and is already adaptable for uses other than papermaking. It is primarily used as a source of cellulose in the manufacture of products such as synthetic fibers, cellulose plastic materials and explosives (12).

In China, it is apparent that import and consumption are high and continue to increase since 1998 (Figure 6). Almost all the consumption in China is met by import, which was 1,248,469 tons in 2011. Domestic production was 15,000 tons per year from 1996 to 2011, while export remains between about 300 tons to 700 tons per year. North America and South Africa export most of the global dissolving wood pulp, while Asia imports the largest quantity. Dissolving pulp is principally applied in the textile industry and tobacco manufacturing. Between 2004 and 2005, 53% of the dissolving pulp was used in the manufacture of viscose. Viscose fiber is easy to be dyed and has good hand feel in textile products. Moreover, the production of viscose fiber improved in China, and it increases more than 10% every year. There were 1,120,000 tons viscose fiber produced in China in 2005, which consisted of 40.3% of the total global production. Viscose fiber is becoming more favorable over artificial fiber due to increasing oil prices, which leads to the increasing use of dissolving wood pulp (12).

Viscose fiber producers and other dissolving pulp users in China have to rely on import to meet the shortage, since there is almost no dissolving pulp products manufactured currently in China. Most import is from South Africa, the United States and Canada. The global demand for dissolving pulp remains between 3,800,000 and 4,200,000 tons during past 7 years. Of which China consumed 61% in 2008 (12).
The dissolving wood pulp is a hybrid of the pulp and paper and textile industry. The production of dissolving pulp is heavily influenced by raw material and cooking. However, the crucial problem which limits the production is the resource. Since cotton farmland has not increased and the production will not change much in the future, choice of raw material is limited to wood and bamboo. On the other hand, Chinese producers have limited experience working with dissolving pulp production, and as such they will have to rely on new processes and technology abroad.

**Chemical Wood Pulp**

Chemical wood pulp is the pulp obtained by processing pulpwood, wood chips or residues to a series of chemical treatments. It includes sulphite, sulphate and soda pulp. China consumes a substantial amount of chemical pulp, which can be bleached, semi-bleached or unbleached (Figure 7). The growth pattern of consumption is similar to import trends. Although both consumption and import declined after 2009, they grew substantially again after 2010 and peaked at 18,557,085 and 12,460,392 tons, respectively in 2011. Domestic production did not change much before 2005, which increasing gently from 1961 to 2005 and reached 1,803,200 tons in 2005. Then it increased rapidly to 4,513,200 in 2008 and grew to 6,127,200 tons in 2011.
Most softwood kraft wood pulp originates from Canada, Russia, The United States, New Zealand and Sweden. Among those countries, Canadian wood pulp has been used for a longest time in China since it has consistent quality. The most popular products are NBSK, UKP and LBSK and they occupied 1/6 of the total pulp import in China. Primary wood production facilities are British Columbia and Alberta, and most raw materials are from residuals or wood chips originating from saw mills. Canadian fibre originates from higher latitude with longer rotation ages and as such is of longer fibre length. The primary species are Red Cedar, Lodge pole Pine, Cedar, Hemlock, White Spruce, Douglas fir and Maple. Different brands come from different companies and different companies use different tree species as well as different ratio of variable wood chips. As a result, wood pulps have different quality and properties even though they originate from Canada. When choosing which wood pulp to use, people have to consider: 1. Conditions of the equipment 2. potential use of wood pulp 3. the consistency of the quality of wood pulp 4. a constant source of the pulp will also be needed (14).

Although the demand for Canadian pulp has increased with the development of China, there are some new competitors who are able to provide consistent and high quality pulp. Since the early 70's, Brazil and Chile have been producing kraft pulp at increasing rates. Brazil, Chile, Uruguay and Argentina have fast growing trees and lower production costs, and as such are easily competing with Canadian supply. As a result, Brazil and Chile have been producing and leading kraft wood pulp
products at the lowest cost in the world. Compared with other regions, South America has advantages in wood cost, selling network, environmental issues as well as operations. In the past 35 years, pulp productions in Brazil increased 7.7% annually, and exports increased 9% per year in the past 10 years. Basically, export values increased dramatically from $35,000,000 in 1970 to $3 billion in 2004, and 40% of it is from pulp products. The production cost of BSKP in Chile is lowest in the world, which is about $200 per ton and BHKP in Brazil costs $155 per ton (16).

**Conclusions**

Since the paper industry in China is rapidly developing and fast becoming a good market, the production of paper products continue to increase. As such, there will be greater competition in getting resources like wood pulp in the future. China’s demands continue to increase, while the global supply of wood fiber is rather stable. With more and more environmental and energy issues, China has to change its industrial structure to transform its traditional paper industry into sustainable and modern paper industry. As the global market and supply is ever changing, producers need to be responsive to changes and take advantage of them.
Reference


