Brazilian position in the Chinese market for hardwood pulp

By: Giácoma Frasson Manhães, Ph.D. from Polytechnic School at University of São Paulo – Brazil.
Experienced in Human Resources and Commercial Management direction positions.
E-mail: gifrasson@hotmail.com

Leia este artigo em português no site: www.revistaopapel.org.br

INTRODUCTION

Woodpulp is a low differentiation commodity. *So, often one might define an acceptable inventory level around which the price fluctuates, and there is a general notion that "everything that is produced will be sold". Indeed, even as a result of the capital involved and the large economies of scale in this industry, this notion is very close to the actual behavior of companies, and market related downtime only takes place under extreme situations. It's what we call a price inelastic supply. It follows that the global* market share *of a pulp supplier is intrinsically related to its production capacity, and industry results are usually expressed as total production capacity or exports. Although extremely important, these data give no information about the preferences of buyers, which are key elements for developing commercial strategies.*

The question that really matters is not "are we managing to sell everything?" But "are we managing to sell everything to the best possible price?" To help answer this question, we need more sophisticated tools to measure the outcome of the sector. In this paper we assess the position of the Brazilian pulp in China compared to its main competitor in this market, the Indonesian pulp, through the analysis of price elasticities of demand for these pulps and the elasticity of substitution between them. The results and observations depicted here are part of a broader study, which addresses the competitiveness of the Brazilian pulp industry compared to other countries, the subject of a doctoral thesis (MANHÃES, 2011).

ELASTICITY OF SUBSTITUTION AND PRICE ELASTICITY OF DEMAND

The most important information provided by the elasticity of substitution is the relative response of factors demand to a change in their relative prices. *From this concept, and considering a number of boundary conditions whose discussion is beyond the scope of this article (for details, see MANHÃES, 2011), it is possible to apply the elasticity of substitution to describe the competitive dynamics between external suppliers to a specific market - for example, one can measure the ease with which the pulp from Brazil can replace the pulp coming from another country in a given market. It is a measure of the preference of buyers in that market. The elasticity of substitution can be negative, this indicates that the products concerned do not replace but complement each other. The elasticity of substitution is calculated from the price elasticities of demand.*

The price elasticity of demand gives information about the response of the market, in terms of demand for a good, to a change in its price (own-price elasticity) or a change in the price of a competing good (cross-price elasticity). These measures do not include the effect of price change in the overall level of consumption, only the impact of price change of one of the factors. Hence, they do not measure the substitutability between a pair of factors, but add information relevant to understanding the competitive dynamics.

The price elasticities of demand can be calculated from the coefficients describing a production function, under specific circumstances. The production function describes the amount of product obtained as a combination of factors of production. By its nature, the production function reflects the laws of the physical universe and technology (BERNDT, 1991). The transcendental logarithmic production function -, translog production function - is based on a second order approximation of an arbitrary production function that has no restrictions to the elasticity of substitution (CHRISTENSEN et al., *1971). Assuming an ideal condition in which the company adapts instantly to price changes, the method gives good predictions of the effects caused by the price change of a factor in the overall demand for that factor in a particular industry. Similarly, the method allows to predict the effects caused by the change in the price of a product originating from a specific country in overall demand for that product in a given market, as in NAGUBADI* et al. *(2004). To observe the effect of substitution of raw materials from different countries, the total demand for pulp is kept constant, as proposed by FUSS (1977). Thus, the demand for pulp can be expressed in terms of shares of the different countries in total imports of pulp by the market studied.*

In this study we used BHKP published average price (CIF Chinese port) and quantities imported by China by country of origin during the period January 2003 to March 2010. The data were kindly provided by Hawkins Wright, and the prices were deflated according to PPI (1982 = 100).

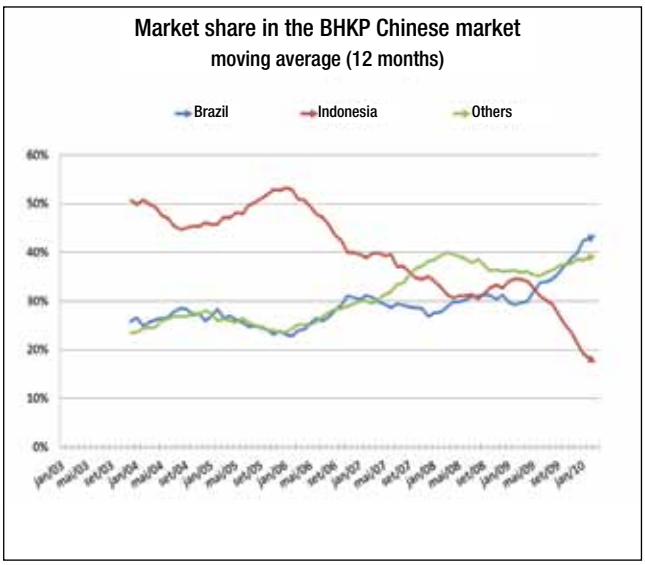


Figure 1. *Evolution of the shares of Brazil, Indonesia and other countries in the Chinese BHKP market expressed as moving average of 12 months[2].*
Source: Hawkins Wright

Figure 2. *Historical prices of BHKP in the Chinese market*
Source: current prices by Hawkins Wright, deflated by the PPI (1982 = 100).

*We built a system of equations to describe the participation of BHKP from different countries in the Chinese market as a function of their prices. This system was fitted to real data on shares and prices by applying the iterative Zellner method for estimating parameters of seemingly unrelated equations (*Seemingly Unrelated Regression, *SUR)[1]. The coefficients obtained by this procedure provided the basis for calculating* own- and cross-price elasticities of demand, *from which we calculated the* elasticity of substitution *between the pulps from different countries.*

BRAZIL AND INDONESIA IN THE CHINESE PULP MARKET

In the period studied, Indonesia led Chinese imports of hardwood pulp, with an average share of 39%, followed by Brazil with 30%. BHKP imports from other countries totaled 31% share in the period. In recent years, however, the Brazilian pulp has been gaining ground in Chinese imports, as shown in ***Figure 1****.*

PRICE ELASTICITY AND ELASTICITY OF SUBSTITUTION IN THE CHINESE MARKET FOR BHKP

All results of the own-price elasticity of demand (or self-elasticity) had the appropriate sign (negative), which indicates a drop in quantity demanded due to increase in its own price. These results are highlighted in bold in Table 1 , which also presents the results of cross-price elasticity.

Self-elasticity values indicate that for a 1% increase in the price of Brazilian BHKP, there is a 4% drop in demand for this pulp. For Indonesian BHKP, there is a 6% drop in demand for 1% increase in price. Indonesian pulp is therefore more sensitive to price than Brazilian pulp in the Chinese market.

The self-elasticity for BHKP from other countries had the correct sign, and its value around 1% suggests that the preference for these pulps in the Chinese market is even less price-dependent than for pulp from Brazil. However,

Table 1. *Price elasticity of demand for BHKP from Brazil, Indonesia and other countries in the Chinese market*

Percentage effect on BHKP demand coming from↓:	For a 1% increase in the price of BHKP from:		
	Brazil	Brazil	Brazil
Brazil	**-4.1%**	**-4.1%**	**-4.1%**
Indonesia	4.4%	4.4%	4.4%
Other countries	-1.6%	-1.6%	-1.6%

* Price elasticities for "other countries" obtained from the coefficient not statistically significant.

[1]*The application of SUR to the determination of the translog production function coefficients was performed with the software EViews 7 (www.eviews.com).*
[2]*Results presented as moving average (12 months) for clarity.*

Table 2. *Illustration of the effect of price elasticities in the Chinese market for BHKP*

	Constant price, US$/t (1982=100)			Share, %		
	Brazil	Indonesia	Others	Brazil	Indonesia	Others*
Average January/2003 to March/2010	385	369	372	30%	39%	31%
1% increase in the price of Brazilian BHKP	**389**	369	372	29%	41%	30%
1% increase in the price of Indonesian BHKP	385	**373**	372	32%	36%	32%
1% increase in the price of BHKP from other countries *	385	369	**376**	29%	40%	31%

** Price elasticities for "other countries" obtained from coefficients not-statistically significant.*

the fact that "other countries" consolidate many different types of pulp, including different fiber morphologies, results in lack of statistical significance of the coefficients used in calculating their price elasticity. Thus the figure for "other countries" is shown only to complement the scenario of competitive dynamics, and our discussion will emphasize the contributions of the two major suppliers to this market, Brazil and Indonesia.

The results of the cross-price elasticity indicate that for a 1% increase in the price of Brazilian BHKP, it is expected a 4.4% increase in quantity demanded of Indonesian pulp. On the other hand, a 1% increase in the price of Indonesian pulp leads to a 5.8% increase in quantity demanded of Brazilian pulp.

If we admit the results relating to "other countries", Table 1 reports that there is a relationship of substitution between BHKP from those countries and from Indonesia, with price elasticity around 2%. Between BHKP from Brazil and from other countries, the negative sign of the cross-price elasticity indicates a complementarity relationship, i.e., the increase in the price of one leads to a reduction in demand for the other. The complementarity between factors will be discussed throughout the analysis of elasticity of substitution.

To illustrate the effect of price elasticities in the Chinese market for BHKP, we use the average of the shares and prices in the period from January 2003 to March 2010 as a baseline. We then simulate the effect of a 1% increase in the price of pulp from Brazil, Indonesia and other countries on that baseline. The results, in terms of redistribution of shares of these pulps in the Chinese market, are given in ***Table 2****.*

For a 1% increase in the price of pulp in Brazil (385 $/t to 389 $/t), i.e. 4 $/t, Brazil's share would decline by about 4%, from 30 % to 29% (down 1.2 percentage points). The participation of other countries would also fall, although less than 2%, to about 30%, while the participation of Indonesia would increase by 4%, rising to 41%.

Despite the absence of statistical significance of the coefficients obtained for the equation describing relative demand of BHKP from other countries, the result for "others" shown in Table 2 is consistent with the dynamics of substitution between BHKP from Brazil and Indonesia. This substitution allows the reliable estimate of the shares of Brazil and Indonesia in the Chinese BHKP to 1% increase in the price of each product. The participation of pulp from other countries under these conditions was obtained from the cross-price elasticities for "other countries" and the result was consistent with the remaining portion of the market, excluding shares of Brazil and Indonesia calculated independently.

*The illustration shows the market reaction on "day one" of the price increase for that pulp, before any movement of price adjustment by its competitors. However, it is not about a mere difference of price: the buyer, of course, always prefers the lowest price, other things being equal. The aim is to find quantifiable evidence of the preferences that go beyond the price. It is noteworthy that the Brazilian pulp price has been systematically higher than the Indonesian during the studied period, and both presented the same price in only 11% of the observations (****Figure 2****). Still, the participation of Brazilian pulp in the Chinese market is not systematically lower than the Indonesian pulp, as shown in Figure 1. This simple observation allows the conclusion that there are other qualitative factors, besides price, that influence the preference of Chinese buyers and favors Brazilian pulp in relation to Indonesian.*

We use the Morishima Elasticity of Substitution (Mij)[3] to quantify the preference of the buyer. ***Table 3*** *presents the results, calculated from the average of the shares and the prices of pulp in Brazil, Indonesia and other countries in the*

Table 3. *Elasticity of substitution (Mij) between BHKP from Brazil, Indonesia and other countries in the Chinese market*

Morishima Elasticity of Substitution, M_{ij}			
M_{BI} =	8.6	M_{IB} =	12.2
M_{IO} =	8.8	M_{OI} =	2.9
M_{OB} =	**-0.8**	M_{BO} =	**2.6**

[1]*Among the different approaches to the elasticity of substitution, the Morishima model has been increasingly adopted for its asymmetry, which is a better fit to the actual behavior of the economy. (TANG et al., 2008).*

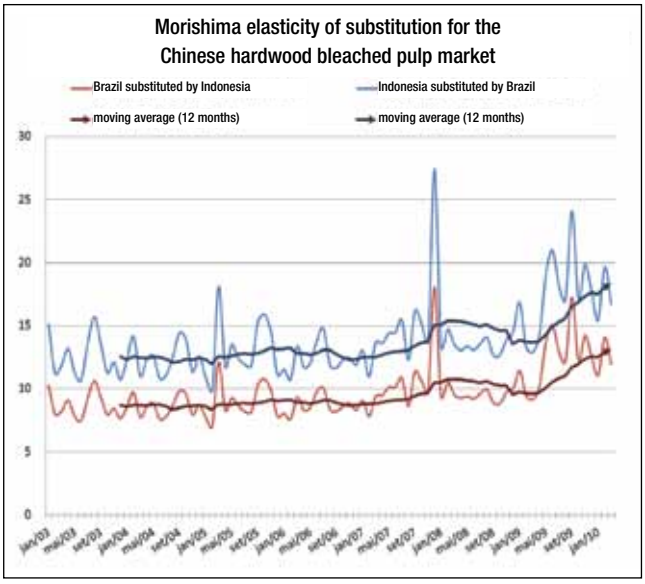
period studied. The magnitude of Mij can be interpreted as the ease with which product j *shifts product* i *in purchase decision. A positive sign indicates that* i *and* j *are substitutes, and when the sign is negative,* i *and* j *are complementary.*

According to Table 3 , Brazilian and Indonesian pulps are substitutes, and the Brazilian BHKP has the ability to displace Indonesian BHKP ($M_{IB} > M_{BI}$).

***Figure 3** shows the evolution of the elasticities of substitution over the period studied. Note that, from January 2009, the market shows higher volatility, as indicated by the increase in elasticities of substitution. This increase in volatility is consistent with the post-crisis economy, which was accompanied by substantial changes in the configuration of the shares in the Chinese market for BHKP (Figure 1) One of the factors that contributed to this change was the convergence of prices that occurred during the whole year 2009 (Figure 2): at the same price level, preference for pulp from Brazil and other countries at the expense of Indonesian pulp redefines market division. Of course, other factors besides price convergence may be driving this process. Note from Figure 1 that the downward trend for the Indonesian pulp share begins much earlier, before 2008 liquidity crisis.*

On acceptance of the results obtained for BHKP from other countries – even in the absence of statistical significance of the descriptive coefficients for its partial demand – we admit a substitution relationship between BHKP and Indonesia, with a broad preference for the pulp from other countries over the Indonesian pulp ($M_{IO} > M_{OI}$). The dynamic between BHKP from other countries and from Brazil is a bit more complex: pulp from other countries may displace Brazilian pulp ($M_{BO} > 0$), but Brazilian pulp is complementary to BHKP from other countries ($M_{OB} < 0$).

***Figure 3.** Evolution of the Morishima elasticity of substitution for the pair Brazil / Indonesia in the Chinese market for BHKP*



The complementarity relationship between inputs that apparently compete may indicate that one of the inputs has a lower attribute, which must be compensated by the presence of another. This attribute may be technical (e.g., less resistant fibers) or economic (compensation for the use of an "expensive" input through the use of a cheaper one while producing low-end products). It may also be due to the production strategy of the consumer: broader diversification in production processes, with different product categories, tends to demand diverse inputs, specific for each category.

Considering the diversity of sources and fiber types comprised by BHKP from "other countries", it is possible that more than one of these processes take place. While the full range of products from other countries - which extends from eucalyptus pulp supplied by Chile and Uruguay to mixed fibers from North America, Russia and South Pacific countries - can overcome a possible technical requirement for Brazilian BHKP, the opposite is not observed.

In contrast, it is observed that between pulp from Indonesia and from other countries the substitution relationship goes both ways. A possible explanation for this is that the purchase of Indonesian BHKP is a process heavily influenced by price.

GENERAL CONSIDERATIONS

At the methodological level, we found that the use of the econometric tools adopted in this study allowed the identification of preferences among competing commodities, provided there is a difference in their prices.

This represents an advantage over some usual result indicators for the competitive process, such as market share *or total exports. This is because, in the case of low differentiation* commodities*, often the* market share *(as well as the volume of exports) is more dependent on the supply (capacity) than on the preferences of consumers. Moreover, the assessment of competitive position through* market share *does not allow projecting the impact of changes in price or supply by a competitor, while the knowledge of the elasticity of substitution and the price elasticities of demand serves as a subsidy for drafting commercial policies.*

On the other hand, although they indicate preferences, the proposed tools do not provide information about the nature *of the attributes that define the preference for "A" or "B". Hence the importance to complement the econometric analysis with other evaluations, qualitative or quantitative, of the agents involved.*

CONCLUSIONS

The presence of Brazil in the Chinese pulp market, although growing, is more recent than that of Indonesia, its main competitor in this market in terms of volume.

Besides the geographical proximity between Indonesia and China, which establishes an important logistical

advantage to the Indonesian pulp, the Chinese market has lower barriers of entry than more mature markets like Western Europe and the United States. In the former markets the requirement for forest sustainability - fully serviced by the Brazilian pulp - has restricted the presence of Indonesian pulp. Although it is a growing concern in China, the certification of sustainable forest management does not yet represent a significant barrier to entry into the Chinese pulp market.

The magnitude of price elasticities of demand in the Chinese market for BHKP indicates high volatility and price orientation. Despite this, the present results indicate that there are extra-price factors that drive BHKP purchasing and favor the Brazilian pulp in relation to Indonesian: Brazilian pulp showed less price sensitivity than Indonesian pulp (smaller modulus of own-price elasticity) and presented higher prices than its main competitor in the period studied. In the Chinese market, Brazilian pulp displaces Indonesian pulp in purchasing decisions more easily than the other way around (indicated by the elasticity of substitution). Therefore, the Brazilian pulp had attributes that made it preferable to Indonesian pulp during the study period.

The analysis of price elasticity and elasticity of substitution in the Chinese market indicate that, in this market, pricing is a viable tool for expanding the participation of Brazilian BHKP, with displacement of the Indonesian pulp. This result is not obvious, considering that the proximity of Indonesia gives it a logistical advantage which is important not only for the low shipping costs involved, but also extra-cost advantages, such as shorter lead-time.

References

BERNDT, ER 1991. The Practice of Econometrics: Classic and Contemporary, New York, Addison-Wesley.

CHRISTENSEN, LR, JORGENSEN, DW & LAU, LJ 1971. Conjugate duality and the transcendental logarithmic function. Econometrica, 39, 255-256.

FUSS, MA 1977. The demand for energy in Canadian manufacturing. An example of production structures with many inputs. Journal of Economy, 5, 89-116.

HAWKINS WRIGHT. *2010. Pulpwatch Data Centre*. London: Hawkins Wright Ltd.

MANHÃES, GF 2011. Elasticity of substitution: a contribution to the analysis of competitiveness of the Brazilian Pulp Industry. Thesis (Ph.D.), University of São Paulo. Portuguese.

NAGUBADI, RV, Zhang, D., PRESTEMON, JP & WEAR, DN 2004. Softwood lumber products in the United States: substitutes, Complements, or unrelated? Forest Science, 50, 416-426.

TANG, X., KANT, S., LAAKSONEN-CRAIG, S. & ASINAS, ER. 2008. *Measuring the competitiveness of Canadian pulp and paper market in the U.S. reveals needs for more research.* Canadian Journal of Forestry Research, 38, 2951-2964.

REVISTA ***O PAPEL***. QUEM VÊ O SEU ANÚNCIO AQUI NÃO ESQUECE

A revista ***O Papel*** é o periódico mais importante do mercado de celulose e papel. Trabalhos técnicos, entrevista e reportagens sobre o setor, novas tecnologias... Tudo passa por nossas páginas. São mais de 16 mil leitores atingidos diretamente.
Pessoas que fazem o dia-a-dia do mercado e que não podem ficar de fora da estratégia de comunicação da sua empresa.

Revista ***O Papel***. A informação que você precisa, e o produto que você procura, você só encontra aqui.

Entre em contato com a ABTCP, por email: relacionamento@abtcp.org.br ou telefone (11) 3874-2738.