

**Market Pulp: Industry Analysis and Assessment of  
Opportunities for Portuguese Pulp Producers**

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**Abstract**

In a global world where Portugal is economically highly integrated, the Paper and Pulp business sectors are amongst the biggest contributors to Portuguese exports, the highest investors in production infrastructures, highly internationalized and has the most competitive players in this industry competing head to head in the international arena.

This thesis aims to understand and create insight on Portuguese companies competing on this industry, their main competitors as well as to conduct a comprehensive analysis of the industry factors affecting the companies.

This dissertation will focus on a very specific segment of the Paper and Pulp markets – the Market Pulp - but will also analyze the broader Paper and Pulp business areas in order to shed some light into the main drivers of the industry and to create awareness of business opportunities that may be created mainly in the short term.

Study findings reveal that Portuguese companies can compete in the global arena by exploiting new markets while leveraging the efficiencies on its production cycles and investment plans.

**Keywords:** Internationalization, Paper, Pulp, Business Opportunities

## **Abstract (Portuguese)**

Num mundo globalizado onde Portugal se encontra profundamente integrado, os sectores do Papel e da Pasta em Portugal estão entre os principais contribuidores para as exportações portuguesas, os maiores investidores em infra-estruturas produtivas, altamente internacionalizados e incluem das mais competitivas empresas mundiais que competem de igual para igual na arena internacional.

Esta tese tem como objectivo compreender e aumentar o conhecimento sobre as empresas portuguesas que competem nesta indústria, os seus principais concorrentes assim como conduzir uma análise exaustiva sobre os factores que afectam as empresas neste sector de actividade.

Esta dissertação orientar-se-á para um segmento muito específico do mercado do Papel e da Pasta – a Pasta de Mercado – mas também analisará as mais alargadas áreas de negócio do Papel e da Pasta no sentido de explicar os principais factores críticos de sucesso na indústria. Tem também como âmbito identificar oportunidades de negócio no segmento da Pasta de Mercado, principalmente no curto prazo.

Os resultados do estudo revelam que as empresas portuguesas neste sector podem competir nos mercados globais explorando novas geografias aproveitando as vantagens competitivas geradas pelas eficiências dos seus ciclos de produção e planos de investimento.

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## Executive Summary

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The purpose of this thesis is to investigate the worldwide Market Pulp business segment of the Paper and Pulp industries while focusing on the Portuguese companies competing in these industries. Therefore it is expected that the main contribution of this study lies on the identification of business opportunities for Portuguese pulp producers.

The study proceeds in four main chapters. Chapter one gives a comprehensive overview of the global Paper and Pulp industries. Chapter two focuses on the Portuguese companies competing in this industry, their strengths and weaknesses as well as the main output markets. Chapter three provides an in depth analysis of the Market Pulp segment including competitors, their production capacity and strategic planning. Finally, Chapter four identifies geographical opportunities where Portuguese companies may allocate resources and the reasons why that should be done.

Throughout the dissertation a combination of exploratory and explanatory methodologies was used. In fact, in a more explanatory research phase, documental analysis of sources were included: RISI and Hawkins Wright, consultancy industry reports, company's financial reports, Paper and Pulp industry dedicated chambers of commerce such as PPPC and CELPA as well as other empirical studies. On the other hand, on a more exploratory research phase, a set of semi structured interviews was conducted with representatives of Portuguese and Spanish companies such as PortucelSoporcel, Altri and ENCE. The purpose of these interviews is to provide a better understanding of the fundamentals of these companies, the critical success factors of the market where they compete and their future business plans.

After gathering the suitable information this study addresses the market equilibrium between supply and demand on the Market Pulp segment as a first step to identify business opportunities.

At the time where this dissertation was written the main data used was collected mainly from RISI 2006 Annual Report, published in 2007, which presents year 2006 overall figures.

Meanwhile, during the writing up of this thesis RISI Annual Report published in 2008, with the 2007 figures, was set out. However, due to budget reasons, once the price of the report is quite expensive, as well as due to the fact the main assumptions and figures remain roughly the same the author decided to use the data and assumptions put forward in the RISI 2006 Annual Report.

In line with other studies recently set out, and mentioned throughout this dissertation, it is acknowledged that market forecasts for paper and pulp may be considered as statistically correlated with GDP growth in each qualified country.

In this context, key success factors for the industry and the current competitive position for Portuguese companies were then included in the analysis. The result is the identification of three attractive geographical areas where resources could be invested.

The main findings in this thesis are that the Western Europe geographical area may be the first target market for the Portuguese companies due to the demand favoring high perceived quality of Portuguese production and lower distribution costs to deliver the product. China/India will be the second suggested target market due to current and future GDP forecasts as well as foreseen population growth for the short, medium and long terms. Last but not the least Eastern Europe and Maghreb are also considered priorities for the future due to the foreseen GDP growth and low transportation costs, relative to other geographical areas.

## **Sumário Executivo**

O objectivo desta tese é investigar o mercado mundial de Pasta de Mercado, segmento das indústrias do Papel e da Pasta, focando nas empresas portuguesas que aqui competem. É, portanto, expectável que o principal contributo deste estudo resida na identificação de oportunidades de negócio para os produtores portugueses de pasta de papel.

O estudo prossegue em quatro capítulos principais. O primeiro capítulo dá-nos uma visão global e exaustiva das indústrias do Papel e da Pasta. O segundo capítulo foca-se nas empresas portuguesas a competir nestas indústrias, os seus pontos fortes e fracos assim como os principais destinos da sua produção. O terceiro capítulo fornece-nos uma análise exaustiva do segmento da Pasta de Mercado incluindo os principais competidores, a sua capacidade de produção e planeamento estratégico. Finalmente o capítulo quarto identifica oportunidades de negócio geográficas para onde as empresas portuguesas poderão alocar os recursos e as razões pelas quais tal deverá ser feito.

Durante a dissertação a combinação de metodologias exploratórias e explanatórias será utilizada. Numa fase mais descritiva da investigação uma análise documental de várias fontes foi utilizada: RISI e Hawkins Wright, relatórios de consultoras da indústria, os relatórios financeiros de várias empresas, relatórios de Associações Comerciais dedicadas à indústria tais como a PPPC e a CELPA assim como outros estudos empíricos. Por outro lado, numa fase mais exploratória, um conjunto de entrevistas semi-estruturadas foi efectuado com responsáveis de empresas portuguesas e espanholas tais como a PortucelSoporcel, Altri e Ence. O propósito das entrevistas é oferecer um melhor entendimento dos fundamentais destas empresas, os factores críticos de sucesso do mercado onde competem e os seus futuros planos de negócio.

Após recolher a informação necessária este estudo analisa o equilíbrio de mercado entre a oferta e a procura no segmento de Pasta de Mercado como primeiro passo para identificar potenciais oportunidades de negócio.



Na altura em que esta tese foi escrita os principais dados utilizados foram fundamentalmente do Relatório Anual 2006 da consultora RISI, publicado em 2007, que apresenta os números relativos a 2006.

Entretanto, durante a elaboração da tese o Relatório Anual 2008, com dados relativos a 2007, foi publicado. No entanto, e devido a motivos orçamentais, dado que o preço do relatório é bastante elevado, assim como pelo facto de as principais conclusões e tendências serem idênticas o autor decidiu utilizar os dados inserido no Relatório Anual 2006.

Em linha com outros estudos recentemente publicados e mencionados durante a dissertação, é reconhecido que as perspectivas futuras de mercado para o papel e a pasta podem ser consideradas como estatisticamente correlacionadas com o crescimento do PIB em cada país.

Neste contexto, os factores críticos de sucesso para a indústria e a actual posição competitiva das empresas portuguesas foram então incluídas na análise. O resultado é a identificação de três áreas geográficas onde recursos poderão ser investidos.

Os principais resultados desta tese indicam que a região geográfica da Europa Ocidental deverá ser o principal objectivo das empresas portuguesas devido a uma procura que favorece a alta qualidade percebida dos produtos portugueses e um menor custo de distribuição para entregar os produtos. China/Índia será o segundo mercado alvo devido às actuais perspectivas de crescimento do PIB assim como do eventual crescimento populacional que se espera continue a ocorrer no curto, médio e longo prazo. Por fim, mas não menos importante, a Europa de Leste e o Maghreb são também considerados prioritários para o futuro dadas as perspectivas de crescimento do PIB e os baixos custo de transporte relativamente a outras áreas geográficas.

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## 1. Introduction – Overview and Purpose of the study

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The main purpose of this thesis is to identify and put forward short, medium and long term business opportunities for Portuguese pulp producers.

This dissertation focuses on one very specific segment of the Paper and Pulp Industry – the Market Pulp. This is the pulp characterized by being sold in the open market.

It is important to mention that Market Pulp does not represent the major part of the Pulp Industry. In fact, in 2007, a worldwide output of 52 Million tonnes of Market Pulp were produced, compared with a global pulp production of 192 Million tonnes and a global paper production of 382 Million tonnes (*RISI, 2007*).

The consumption in the market pulp segment is dependent upon the consumption of paper. This in turn may be considered as derived demand. Perceived as a commodity, the Market Pulp segment has not been so far a focus of research as it is the case of other downstream business segments such as newsprint, tissue or office paper. Nevertheless, it is an interesting case: despite the concentration of the worldwide production (the biggest 35 world producers represent 81% of total installed capacity – *RISI, 2007*), it is a very competitive market since it is sold in international markets with intense price pressure reflecting this hard competition.

Although the focus of this study lies on the Market Pulp, it is important to analyze the wider markets, such as the Paper and Pulp market, where that commodity supplies the production process. Therefore this research will first present the world Paper and Pulp industries by identifying the main consumer markets and geographical production areas. This dissertation will then proceed to the Portuguese Paper and Pulp markets and next it will move forward to the worldwide Market Pulp segment.

In addition, the study gives a comprehensive overview about the more specific Portuguese Market Pulp producers, the internal environment analysis of the two main producers in a context of market globalization of this industry. Once again the overall

objective is to identify and address business opportunities and course of actions for Portuguese companies enabling them to better allocate their resources in a parsimonious way. The main Portuguese companies competing in this industry global arena are PortucelSoporcel and Celbi (*Index PSI 20, December 2008; Exame 500, 2008*).

It is important to notice that the aim of this research is to identify business opportunities in a time when investments in capacity, both by the Portuguese companies and the major competitors, are being made. This may mean a near future imbalance in the supply and demand of Market Pulp. Nonetheless the decision to increase or decrease capacity is beyond the scope of this thesis.

## 2. Pulp – Definition, Utilizations and Production Process

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*In this chapter definitions of pulp, its possible utilizations and the pulp production process are presented.*

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### 2.1 Definitions of the Different Types of Pulp

**Pulp** - is “*the chemically or mechanically produced mass of fiber that is used to create paper and board*” (Finnish Forest Industry Federation, 2006).

**Integrated Pulp** – is the pulp used by vertically integrated companies which use own produced pulp as input for paper.

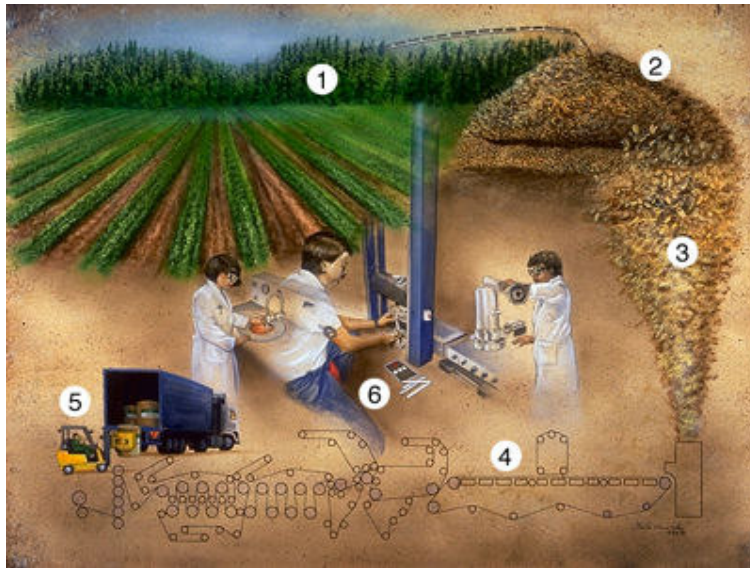
**Market Pulp** – is the pulp sold in the open market. For statistical purposes any pulp that crosses an international border is defined as “Market Pulp” even if it is to be used by another mill belonging to the same company in another country (*Pulpwatch website [www.pulpwatch.com](http://www.pulpwatch.com)*).

### 2.2 Main utilizations and Production Process

Pulp is mainly used to manufacture paper and paperboard products but it can also be used as an input to other products such as photo films, cellophane and explosives. It is however estimated that more than 95 % of pulp is used to manufacture some type of paper product. Over 90% of pulp is produced from wood with the remaining being produced with other raw materials such as straw bamboo, bagasse, kenaf, hemp and cotton (*Market Pulp Association Website [www.pppc.org](http://www.pppc.org)*)

Figure 1 shows the full flow of paper production from the raw material (the trees), until the final product. Pulp production is a part of this process and is below detailed further:

**Figure 1**



**Pulp and Paper Industry**

(1) Harvesting the trees (2) Cut into logs and taking to the mill (3) Machinery turns wood chips into pulp (4) pulp is mixed with water and poured onto a long machine (5) the fibers bond to one another at the dry end of the machine (6) researchers perform tests at each stage (artwork by Claire Tremblay).

*Source: The Canadian Encyclopedia ([www.thecanadianencyclopedia.com](http://www.thecanadianencyclopedia.com))*

Pulp can be produced primarily by two different types of processes that are mechanical pulp and chemical pulp.

Mechanical pulp is originated by shredding logs and is mainly used for applications such as newsprint and tissues. Despite being the main pulping process until the late 30s of last century it is now rarely used (only 19 % of total pulp produced is mechanical – (RISI, 2007)

On the other hand chemical pulp is subdivided into two groups: (1) sulphite pulps and (2) sulphate pulps.

- Sulphite pulps come from a chemical pulping process in which the raw material (wood chips) is cooked in liquor containing sulphur dioxide and calcium or ammonium sulphite.
- Sulphate pulps are the most commonly produced and used. In this method the wood chips are cooked in an alkaline solution. The lignin from the wood is dissolved leaving behind a solution mainly composed of fibers. This solution is brown and therefore needs to be bleached to accommodate most of the applications such as printing or office paper. (*Tappi website [www.tappi.org](http://www.tappi.org)*)

Pulp can be bleached or unbleached and can also be made from both hardwood (such as Eucalyptus and Oak) and softwood (such as Pine). Paper made from hardwood – the wood has very short fibers – is weaker but smoother being therefore better to write and print. Paper made from softwood – the wood has longer fibers - is more resistant but rougher being more used for packaging and other uses (*Tappi website [www.tappi.org](http://www.tappi.org)*).

Table 1 shows some examples of end user application for each of the types of pulp. However it is important to notice though that most of paper types like fine papers, printing papers, magazine papers and even corrugated card boxes and newsprint are produced using a combination of two or more types of pulp.

**Table 1**  
**Types Pulp and end uses**

<b>Type of pulp</b>	<b>Wood Raw Material</b>	<b>Fibers</b>	<b>Characteristics</b>	<b>Possible End use applications</b>
<i>Bleached Softwood Pulp</i>	<ul style="list-style-type: none"> <li>• Pine</li> <li>• Spruce</li> </ul>	Long	<p>Stronger paper with rougher finishing</p> <p>Improves the runnability of paper in the paper machine</p>	<ul style="list-style-type: none"> <li>• Linerboard</li> <li>• Packaging Paper</li> <li>• Magazine paper</li> </ul>
<i>Bleached Hardwood Pulp</i>	<ul style="list-style-type: none"> <li>• Oaks</li> <li>• Eucalyptus</li> </ul>	Short	<p>Weaker but smoother</p> <p>Increases printability of paper</p>	<ul style="list-style-type: none"> <li>• Writing and printing paper</li> <li>• Sanitary paper</li> </ul>
<i>Unbleached Pulp</i>				<ul style="list-style-type: none"> <li>• Sack paper</li> <li>• Packaging paper</li> </ul>
<i>Mechanical</i>			<ul style="list-style-type: none"> <li>• Poor strength</li> <li>• Tendency to yellowing</li> </ul>	<ul style="list-style-type: none"> <li>• Newsprint</li> </ul>

*Source: The Author derived from the literature*

Despite the different characteristics of the several types of pulp, in the end all of them can be understood as substitutes to a certain extent. So the evolution, market availability and prices of one will affect the demand for the others (PPPC, 2007)

Pulp production is widely understood as a very capital intensive process. The current investment projects stated below are examples of that:

- An investment of EUR 320 Million will be needed for an increased capacity of 250.000 tonnes in CELBI factory
- The Veracel mill, a joint venture between Brazilian Aracruz and StoraEnso which entailed an investment of USD 1, 25 Billion for a mill with capacity of 900.000 tonnes.
- Suzano Papel e Celulose investment of USD 1,3 Billion on its second Mucuri production line in Brazil to add extra 900.000 tonnes.



### **3 The Global Paper and Pulp Markets – Supply and Demand**

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*The aim of the chapter is to give the background and global overview of the Paper and Pulp markets where the core subject of this dissertation, Market Pulp, is included.*

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Currently just over 95% of pulp is used to produce some type of paper (PPPC, 2007). Therefore one may say that the demand for pulp derives and depends directly on the final demand of these paper products.

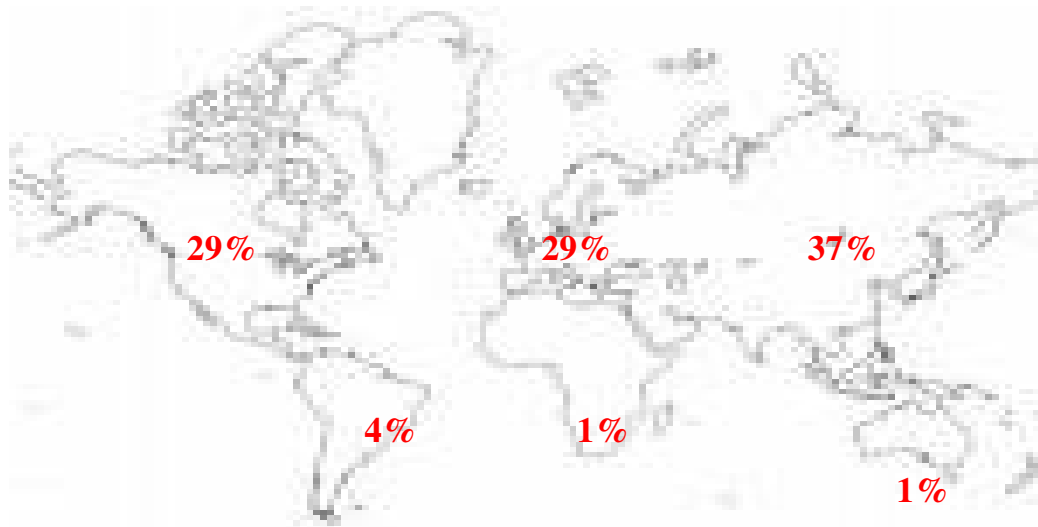
Pulp that is not integrated within the same company's paper production process is a commodity and is marketed by pulp producers based on price and service to paper manufacturers that are not vertically integrated. It is called Market Pulp and it is the focus of this study.

Paper is produced with several inputs such as recycled fiber, chemicals and minerals but pulp still accounts for more than 50 % of total input (TAPPI, PPPC websites). That is a strong indication of the relation and demand elasticity between paper and pulp.

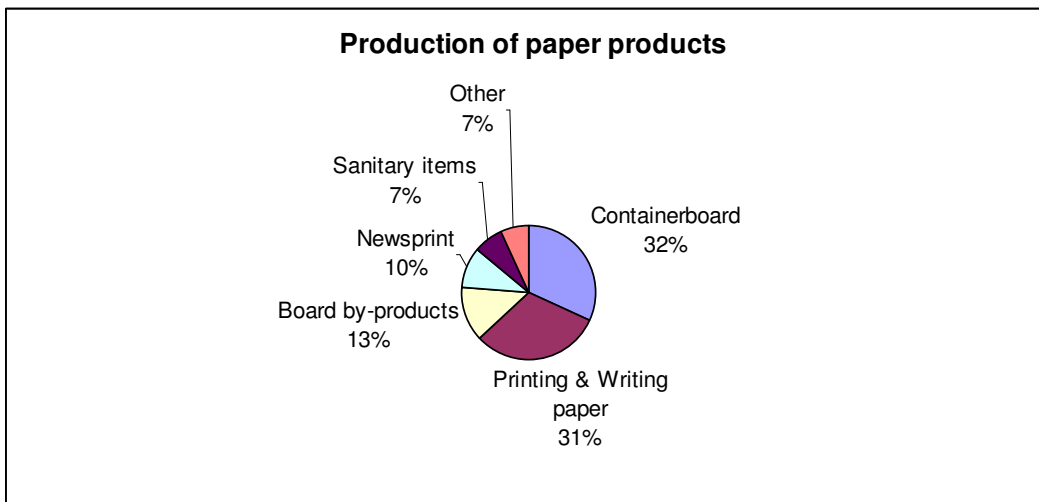
#### **3.1 World Paper Production**

The demand for paper and paperboard derives from the final demand of products such as newspapers, magazines, office paper, stationery, packaging and sanitary items (as tissues and toilet paper). The overall demand for these products influences directly the demand for paper and pulp and therefore also their prices. Map 1 shows the relative percentage of paper production by geographical regions while Figure 2 presents the final use of global paper production

**Map 1**



**Figure 2**



*Source: Adapted from RISI Inc. "Pulp and paper production annual report 2006"*

These aggregated figures hide different geographical realities that can be analyzed in Table 2 representing the different consumptions per type of product.

**Table 2**  
**WORLD PAPER & BOARD PRODUCTION BY GRADE 2005 - 2006**

% of total production per area		Asia	Europe	North America	Latin America	Africa	Australasia	Total
<b>Newsprint</b>	<b>2005</b>	8,2%	11,8%	12,4%	5,1%	10,6%	20,2%	10,5%
	<b>2006</b>	8,1%	12,0%	11,6%	5,1%	10,3%	18,0%	10,2%
<b>Printing/writing</b>	<b>2005</b>	29,8%	36,1%	28,3%	23,0%	21,0%	15,5%	30,7%
	<b>2006</b>	29,7%	35,8%	28,2%	23,2%	23,6%	15,0%	30,6%
<b>Tissue</b>	<b>2005</b>	6,2%	6,2%	7,3%	14,0%	9,5%	6,8%	6,9%
	<b>2006</b>	6,1%	6,0%	7,4%	14,4%	9,6%	6,9%	6,9%
<b>Containerboard</b>	<b>2005</b>	34,7%	24,9%	33,3%	38,7%	43,3%	47,3%	31,8%
	<b>2006</b>	35,0%	25,2%	34,1%	38,7%	42,3%	49,8%	32,3%
<b>Board</b>	<b>2005</b>	12,6%	12,6%	14,5%	10,1%	7,0%	8,1%	12,9%
	<b>2006</b>	12,8%	12,7%	14,6%	10,0%	6,8%	8,3%	13,0%
<b>Total P&amp;B*</b>	<b>2005</b>	91,5%	91,7%	95,8%	90,9%	91,4%	97,9%	92,8%
	<b>2006</b>	91,7%	91,6%	95,8%	91,4%	92,6%	97,9%	92,9%

\* Not including "Other paper categories"

Source: RISI Inc. "Pulp and paper production annual report 2006"

If data is analyzed per area some interesting differences can be seen if compared with global production. Printing and Writing Paper have more relative importance in Europe where they worth 36 % of total while in Asia the containerboard is relatively more important and is worth 35% of total consumption. This can be seen as a result of the increased importance of Asia as a producing area for many products – hence needing containerboard to better accommodate the goods before shipping to consumer markets in Europe and USA.

All these factors are important to paper producers as different types of paper need to be produced for the different markets. For the pulp producers it is also important as, for example, containerboard and board need Unbleached Kraft Pulp while for newsprint, printing and writing paper bleached pulp is required for the production. So depending on the markets, the demand levels will be different, as well as the type of product.

In *Appendix 1* data is presented in absolute figures.

Table 3 presents the production growth rate for several paper categories over the period of 2005-2006 in the different geographical areas:

**Table 3**  
Development 2006 compared with 2005 for several types of paper

% growth rate	Newsprint	Printing/writing	Tissue	Containerboard	Board	Total P&B**
	2006/2005	2006/2005	2006/2005	2006/2005	2006/2005	2006/2005
<b>Asia</b>	7,8%	8,8%	7,0%	10,0%	9,9%	<b>9,0%</b>
<b>Europe</b>	4,5%	2,2%	1,1%	4,2%	3,6%	<b>3,2%</b>
<b>North America</b>	(6,3)%	(0,5)%	1,4%	2,6%	0,4%	<b>0,1%</b>
<b>Latin America</b>	2,9%	3,3%	5,6%	2,7%	2,1%	<b>2,7%</b>
<b>Africa</b>	0,0%	15,4%	4,2%	0,6%	0,0%	<b>2,9%</b>
<b>Australasia</b>	(10,9)%	(3,7)%	0,4%	4,7%	1,9%	<b>(0,4)%</b>
<b>Total</b>	<b>1,5%</b>	<b>3,9%</b>	<b>3,5%</b>	<b>5,8%</b>	<b>4,7%</b>	<b>4,3%</b>

\* Not including "Other paper categories"

*Source: Adapted and Expanded from RISI Inc. "Pulp and paper production annual report 2006"*

It can be argued that the increased aggregated production of all paper categories in 2006 was 4,3 % but different growth rates were seen on the several categories where the containerboard has the fastest growing pace at 5,8% (from an already high base) to the lower growth on Newsprint category.

### 3.2 World Paper Consumption

In terms of consumption by type of products, reliable figures are not available by reputable sources, but it is possible to analyze the aggregated consumption of Paper and Board, respectively, in 2005 and 2006. Map 2 shows the regional consumption relative

to global consumption. Furthermore Table 4 includes consumption growth rate of year 2006 compared with 2005:

Map 2

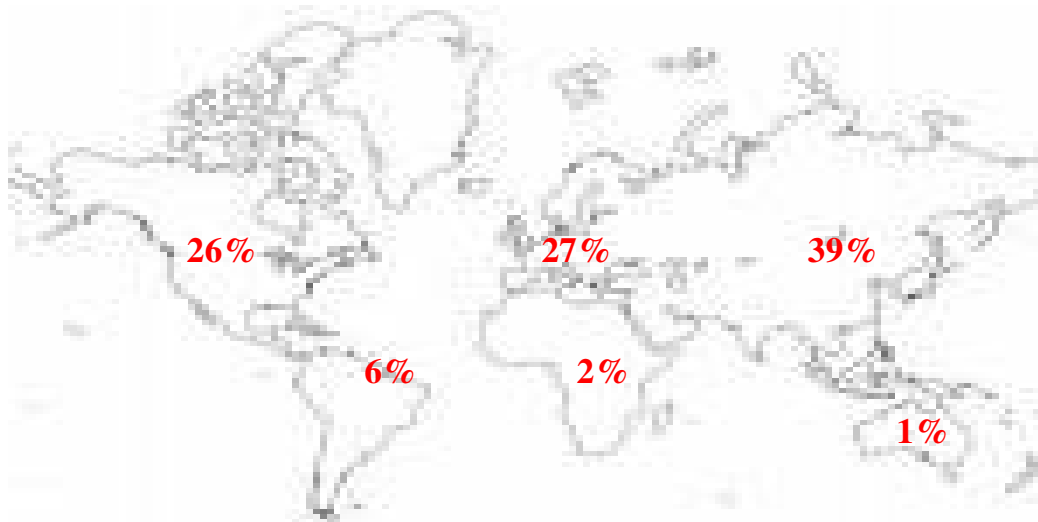


Table 4

WORLD PAPER & BOARD CONSUMPTION 2005 - 2006

(1000 tonnes)	2005	2006	Growth Rate
Asia	138.937	148.350	6,8%
Europe	98.376	101.798	3,5%
North America	96.788	97.644	0,9%
Latin America	21.856	23.477	7,4%
Africa	6.297	6.631	5,3%
Australasia	4.500	4.533	0,7%
<b>Total</b>	<b>366.754</b>	<b>382.433</b>	<b>4,3%</b>

Source: Adapted and Expanded from RISI Inc. "Pulp and paper production annual report 2006"

The overall production growth rate of 4, 3% is the same as the growth in consumption (see Table 3 above). This means that in absolute figures the increased production of 15,752 tonnes was absorbed by the extra consumption of 15,679 tonnes. Therefore it can be argued that market equilibrium between supply and demand was achieved.

In addition while growth is stagnant in mature markets such as North America (United States and Canada) it is growing at a high rate level in Asia and Latin America. Even mature markets such as Europe have witnessed a relatively high growth rate of 3,5% well above the one of North America of only 0,9%. Indeed Europe has benefited from the increased consumption of Eastern European markets still far from saturation. (see Table 4)

### 3.3 World Pulp Production

The world pulp production, which derives directly from paper demand, will be analyzed in this section. Table 5 shows that the pulp production is around half the paper production acknowledging therefore that over 50 % of paper raw material is pulp and that the vast majority of pulp (over 95 %) is used to produce some kind of paper category. Table 5 also shows the geographical areas where pulp is produced as well as the growth rate of the production in each of these areas

**Table 5**  
**WORLD PULP PRODUCTION BY PULP TYPE 2005 – 2006**

(1000 tonnes)	Chemical pulp*		Mechanical		Other pulp		Total pulp**	
	2005	2006	2005	2006	2005	2006	2005	2006
<b>North America</b>	62,189	61,352	16,090	15,324	216	216	78,495	76,892
<b>Europe</b>	33,380	34,774	15,423	15,983	665	675	49,468	51,432
<b>Asia</b>	13,701	13,985	1,701	1,808	18,570	20,173	33,972	41,638
<b>Latin America</b>	13,820	14,996	1,085	1,079	707	607	15,612	16,682
<b>Africa</b>	1,837	1,874	288	294	848	857	2,973	3,027
<b>Australasia</b>	1,463	1,476	1,257	1,144	0	0	2,720	2,620
<b>Total</b>	<b>126,390</b>	<b>128,457</b>	<b>35,843</b>	<b>35,631</b>	<b>21,006</b>	<b>22,528</b>	<b>183,239</b>	<b>192,291</b>

\*Includes Semi-chemical pulp

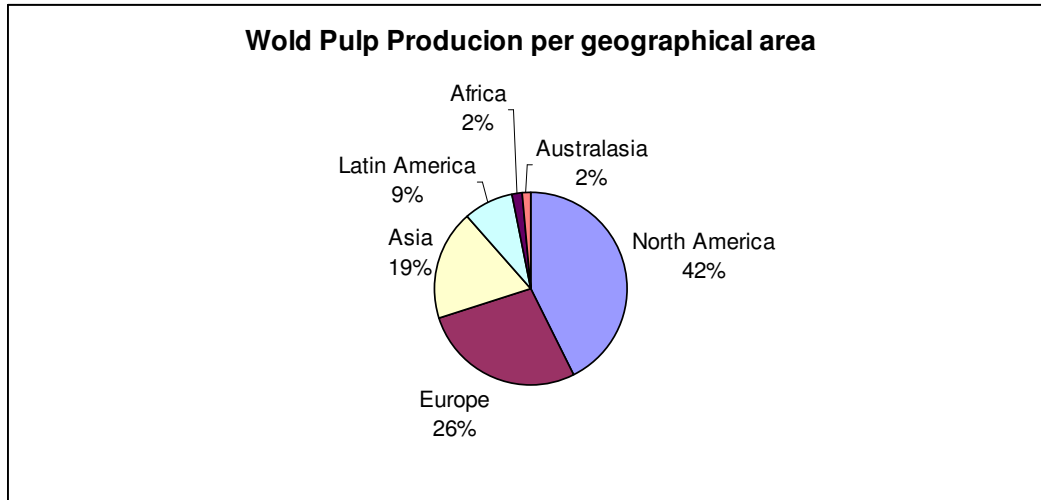
\*\* Includes undefined pulp totals from countries reporting "pulp" without a specific breakdown

Source: Adapted from RISI Inc. "Pulp and paper production annual report 2006"

Mechanical Pulp represents just 19 % of total pulp produced and the production is being reduced in recent years.

The same information can be put forward by presenting the relative importance that each area has for the total production, as well as the growth rate in each per pulp segment (see Table 6 and Figure 3).

Figure 3



In addition, the growth rates in 2006 for the different observed areas/types of pulp are stated:

Table 6  
World Pulp Production Growth rate 2006/2005

% growth rate	Chemical pulp	Mechanical	Other pulp	Total pulp*
	2006/2005	2006/2005	2006/2005	2006/2005
<b>North America</b>	(1,3)%	(4,8)%	0,0%	(2,0)%
<b>Europe</b>	4,2%	3,6%	1,5%	4,0%
<b>Asia</b>	2,1%	6,3%	8,6%	5,9%
<b>Latin America</b>	8,5%	(0,6)%	(14,1)%	6,9%
<b>Africa</b>	2,0%	2,1%	1,1%	1,7%
<b>Australasia</b>	0,9%	(9)%	0,0%	(3,7)%
<b>Total</b>	<b>1,6%</b>	<b>(0,6)%</b>	<b>7,2%</b>	<b>1,8%</b>

\* Includes undefined pulp totals from countries reporting "pulp" without a specific breakdown

Source: *Adapted and Expanded from RISI Inc. "Pulp and paper production annual report 2006"*

Despite North America (including Canada) being the biggest production area in the world with 42% of the total, it is decreasing the production not only in relative but also in absolute terms. On the other hand Europe is increasing production, despite being already stable in a market that may be characterized by being in a mature phase, while most of the growth comes from Asia and Latin America.

The current situation is mainly due to greenfield investments in Asia and Latin America, but also from substitution and renewal investments in Europe and from restructuring of North America pulp industry with downsizings, closing of factories and mergers among paper and pulp producers (*RISI, 2007*)

### 3.4 World Pulp consumption

Table 7 gives an overview on the world pulp consumption per area:

**Table 7**  
**World Pulp Consumption**

(1000 tonnes)	2005	2006	% of total 2005	% of total 2006	% change 2006/2005
<b>North America</b>	68.122	67.088	36,0%	34,9%	-1,5%
<b>Europe</b>	55.033	55.904	29,1%	29,1%	1,6%
<b>Asia</b>	52.911	55.382	27,9%	28,8%	4,7%
<b>Latin America</b>	8.748	9.339	4,6%	4,9%	6,8%
<b>Africa</b>	2.306	2.448	1,2%	1,3%	6,2%
<b>Australasia</b>	2.203	2.103	1,2%	1,1%	-4,5%
<b>Total</b>	<b>189.323</b>	<b>192.264</b>	<b>100,0%</b>	<b>100,0%</b>	<b>1,6%</b>

*Source: Adapted from RISI Inc. "Pulp and paper production annual report 2006"*

These figures give evidence that Asia is rising steadily on the consumption as well as Latin America despite the fact that the latter is still emerging in the global market in recent years. North America and Europe are still the biggest Pulp consuming areas.



### 3.5 Matching pulp production and consumption

Table 8 shows the 2006 worldwide production and consumption of pulp in the main geographical regions.

**Table 8**  
**World Pulp Production vs Consumption**

<b>(1000 tonnes)</b>	<b>Production</b>	<b>Consumption</b>	<b>Difference</b>
<b>North America</b>	76.892	67.088	9.804
<b>Europe</b>	51.432	55.904	-4.472
<b>Asia</b>	41.638	55.382	-13.744
<b>Latin America</b>	16.682	9.339	7.343
<b>Africa</b>	3.027	2.448	579
<b>Australasia</b>	2620	2.103	517
<b>Total</b>	<b>192.291</b>	<b>192.264</b>	<b>27</b>

*Source: Adapted and Expanded from RISI Inc. "Pulp and paper production annual report 2006"*

These figures give evidence that, while in North and Latin America there is a surplus (respectively 9, 8 Million and 7, 3 Million tonnes), in Europe and Asia there is a pulp deficit (4, 4 Million and 13, 7 Million tonnes respectively). This is undoubtedly a strong indication of the potential opportunities that lie ahead for market pulp producers. These issues will be further expanded in the next chapters.

### 3.6 Country Analysis for Paper and Pulp

One can further fragment the data for Paper, Board and Pulp in terms of production and consumption on a country basis. In this study data will be used for the 30 most representative countries in each category.

*Appendix 2* presents an analysis, specific for each of the 30 countries, with data referring to Paper and Board production and consumption as well as Pulp production

and consumption. The percentage change from 2005 to 2006 is also detailed. The 30 countries per category account for around 95 % of total Paper and Board production, 90 % of consumption, 98% of the Pulp production and 96% of total Pulp consumption. Thus, it can be argued that this analysis addresses the vast majority of the world market.

Moreover, data shown in Appendix 2 also allow assessing the market potential for the Market Pulp, which is the core purpose of this dissertation.

In this context this study compares and matches producing and consumption markets (see Table 9). If countries are found in which the consumption is significantly higher than the national production, then there is a strong indication of business opportunities for companies in the Market Pulp segment.

**Table 9**  
**Pulp consumption VS Pulp production by main consuming countries in 2006**

<b>(1000 tonnes)</b>	<b>Pulp consumption</b>	<b>Pulp production</b>	<b>Surplus / deficit</b>
<b>1. USA</b>	53.851	53.215	<b>(636)</b>
<b>2. China, People´s Rep</b>	26.058	18.160	<b>(7.898)</b>
<b>3. Canada</b>	13.237	23.677	<b>10.440</b>
<b>4. Japan</b>	13.019	10.884	<b>(2.135)</b>
<b>5. Finland</b>	10.639	13.066	<b>2.427</b>
<b>6. Sweden</b>	9.212	12.240	<b>3.028</b>
<b>7. Germany</b>	6.664	2.938	<b>(3.726)</b>
<b>8. Russia</b>	5.699	7.270	<b>1.571</b>
<b>9. Brazil</b>	5.387	11.282	<b>5.895</b>
<b>10. Italy</b>	4.199	683	<b>(3.516)</b>
<b>11. France</b>	3.896	2.466	<b>(1.430)</b>
<b>12. Indonesia</b>	3.794	5.672	<b>1.878</b>
<b>13. India</b>	3.678	3.250	<b>(428)</b>
<b>14. South Korea</b>	3.027	506	<b>(2.521)</b>
<b>15. Austria</b>	2.416	1.930	<b>(486)</b>
<b>16. Spain</b>	1.991	2.037	<b>46</b>
<b>17. Portugal</b>	1.758	2.065	<b>307</b>
<b>18. Norway</b>	1.686	2.304	<b>618</b>
<b>19. South Africa</b>	1.678	2.321	<b>643</b>
<b>20. United Kingdom</b>	1.628	287	<b>(1.341)</b>

<b>21. Australia</b>	1.461	1.119	<b>(342)</b>
<b>22. Poland</b>	1.446	1.062	<b>(384)</b>
<b>23. Thailand</b>	1.416	1.129	<b>(287)</b>
<b>24. Taiwan</b>	1.253	392	<b>(861)</b>
<b>25. Mexico</b>	1.115	282	<b>(833)</b>
<b>26. Chile</b>	987	3.550	<b>2.563</b>
<b>27. Netherlands</b>	835	127	<b>(708)</b>
<b>28. Belgium</b>	685	507	<b>(178)</b>
<b>29. New Zealand</b>	642	1.501	<b>859</b>
<b>30. Switzerland</b>	623	239	<b>(384)</b>
<b>Total</b>	<b>183.980</b>	<b>186.161</b>	<b>2.181</b>

*Source: Adapted and Expanded from RISI Inc. "Pulp and paper production annual report 2006"*

The overall surplus of Pulp in these 30 countries hides different realities of the countries. There are countries with a very significant surplus such as Canada (10, 4 Million tonnes), Brazil (5, 9 Million tonnes) and Chile (2, 5 Million tonnes) and others with a strong deficit such as China (7, 9 Million tonnes), Germany (3, 7 Million) and Italy (3, 5 Million).

The highly deficit countries jointly with the ones with higher growth rate in terms of demand for paper products are the ones with the biggest opportunities for market pulp producers in general and for Portuguese companies in particular.

#### **4. The Portuguese Paper and Pulp Markets Industries**

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*In this chapter the Paper and Pulp industries in Portugal are analyzed. A description of supply in Portugal and the demand for Portuguese production is given and the main trends for the utilizations and export markets are reported. The main companies and their relative importance in the industry are stated and described*

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Portugal is an important player both in the paper and pulp markets being the 16<sup>th</sup> pulp producer, 17<sup>th</sup> pulp consumer and the 30<sup>th</sup> paper producer in the world. It has two companies in the top 35 in the world and has 2, 1 % of the worlds' market pulp production capacity (RISI, 2007)

##### **4.1 Paper production in Portugal**

In 2006 Portugal produced 1, 63 Million tonnes of Paper and Board turning the country into the 30<sup>th</sup> biggest producer in the world. This industry worldwide is generally concentrated. Portugal follows this pattern that is the total production is concentrated in the following companies:

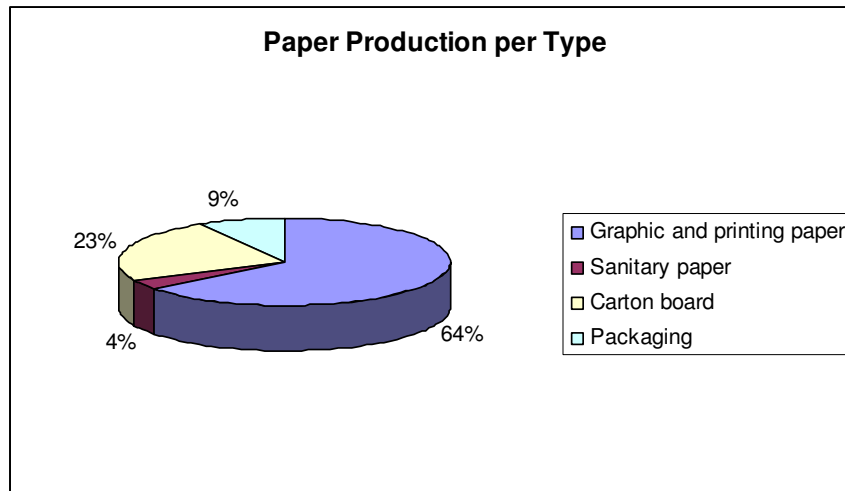
- *PortucelSoporcel Group* which produced 1.024 Million tonnes of paper in 2006
- *CPK*: this company is owned by Altri Group and produces only packaging paper. In 2006 paper production amounted 60.000 tonnes.
- *Portucel Viana*: This company is part of the Spanish group EUROPAC and specializes in paperboard and carton board. In 2006 it produced 290.000 tonnes.

The above 3 companies together produced, in 2006, 1.374 Million tonnes of paper products which represents 84 % of the total. PortucelSoporcel group alone represents 63 %.

Regarding the product segment the main type of paper produced is for graphical and printing use with 64 % (1,044 Million tonnes) of the total followed by a significant

amount of carton board representing 23% of the total (378.000 tonnes). Packaging and sanitary paper make for the remaining. Figure 4 shows the Portuguese paper production.

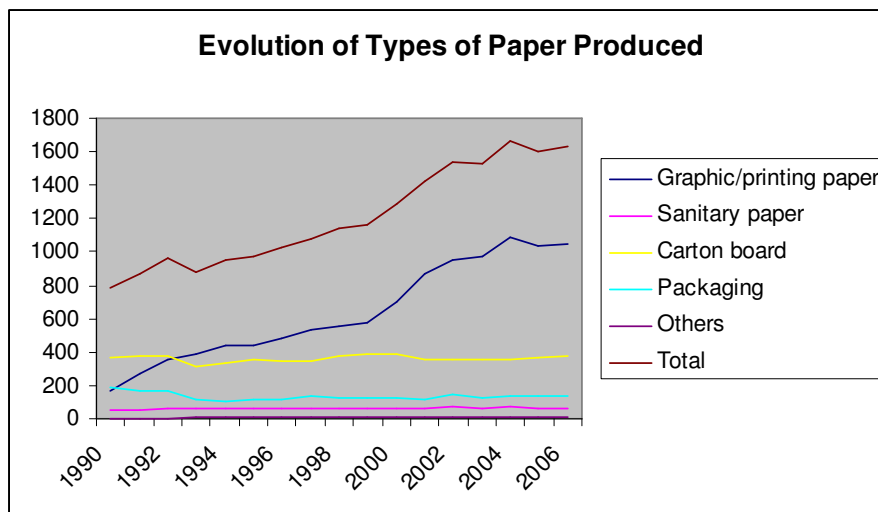
Figure 4



Source: Adapted from CELPA, 2006 Statistics Report.

Analyzing the production pattern since 1990 one can see an increasing production of paper for graphic and printing use (from 167.000 tonnes representing 21% of the total in 1990 to 1.044 Million tones in 2006), while packaging paper is decreasing (in 1990 this type of paper was worth 186.000 tonnes with a relative weight of 23 %). Sanitary paper and carton board have witnessed stable production but are also losing relative weight. Figure 5 shows the evolution over time on all types of paper since 1990.

Figure 5



Source: Adapted from CELPA, 2006 Statistics Report

Empirical data shows that graphic and printing paper segments have an average annual growth rate of 11, 5 %. In contrast packaging has a negative growth rate of 2 % per year over the same period of time. The total production is clearly following the pattern of the graphical and printing paper segments.

#### 4.2 Paper Sales for Portuguese Companies

In 2006 Portuguese companies have sales of 1,64 Million tonnes split up according to Table 10:

**Table 10**  
**Portugal Paper Sales**

(1000 tonnes)	<b>2005</b>	<b>2006</b>
<b>Total Sales</b>	<b>1603</b>	<b>1640</b>
Domestic market	349	340
<i>Exports</i>	1254	1300
<i>EU excl. PT</i>	961	1031
<i>Rest of World</i>	293	269

*Source: Adapted and Expanded from CELPA, 2006 Statistics Report*

Main destination of paper produced in Portugal was Spain with 340.000 tonnes, followed by Germany (182.000), France (180.000) and Italy (127.000). These four countries together with Portugal accounted for 70 % of the total volume sales. In addition, taking into consideration the fact that Portuguese companies are decreasing the exports to the rest of the world, the level of dependency on a few destinations is a reason for some concern.

### 4.3 Pulp production in Portugal

The worldwide importance of Portugal in the Paper industry segment may be considered quite high since it is the world's 30<sup>th</sup> biggest paper producer. By the same standard in the Pulp and Market Pulp segments Portugal's relative importance is even higher, as Portugal accounts for 1 % of the global pulp production, being the 16<sup>th</sup> biggest producer and 17<sup>th</sup> biggest consumer (*RISI, 2007*)

Pulp production is even more concentrated than paper with the two main groups producing 91 % of the total:

- *PortucelSoporcel Group* produced over 1,320 Million tonnes of pulp in 2006 from which 761.000 tonnes were integrated and 559.000 tonnes sold in the market.
- *Altri group* via its companies *CELBI, CAIMA & CELTEJO* sold 500.000 tonnes of pulp to the market while 60.000 tonnes were integrated in its Sack Kraft production facility in *CPK*.

These two groups combined are worth 91 % of the total Portuguese pulp production and 92 % of the market pulp.

Portugal produced 2,064 Million tonnes of Pulp during 2006. From these, 915.000 tonnes were produced to integrate in the paper producing process and 1,149 Million tonnes were Market Pulp (*CELPA, 2007*).

Table 11 describes a comparison between 2005 and 2006 relative to Market Pulp and Integrated Pulp:

**Table 11**  
**Portuguese production – integration vs. market pulp**

(1000 tonnes)	<b>2005</b>	<b>2006</b>
<b>Market Pulp</b>	1131	1149
<b>Integrated Pulp</b>	859	915

*Source: CELPA, 2006 Statistics Report*

While Market Pulp has grown 1, 6 %, pulp produced for integration purposes has increased by 6, 5 %, which may indicate the move of the companies to more value added products. That can be further evident when analysing the figures since 1990 as shown in Table 12:

**Table 12**  
**Integration vs. open market – yearly development**

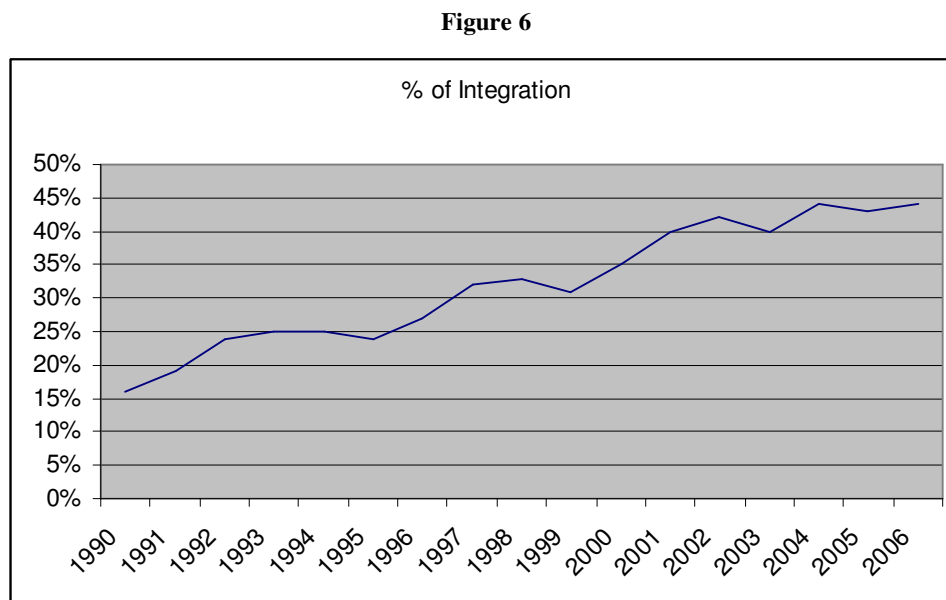
<b>Pulp production (1000 tonnes)</b>			
	<b>Integrate</b>	<b>Market Pulp</b>	<b>Total</b>
<b>1990</b>	238	1211	1449
<b>1991</b>	304	1315	1619
<b>1992</b>	381	1211	1592
<b>1993</b>	387	1133	1520
<b>1994</b>	378	1161	1539
<b>1995</b>	384	1233	1617
<b>1996</b>	433	1161	1594
<b>1997</b>	543	1160	1703
<b>1998</b>	556	1152	1708
<b>1999</b>	550	1205	1755
<b>2000</b>	614	1160	1774
<b>2001</b>	729	1076	1805
<b>2002</b>	809	1118	1927
<b>2003</b>	733	1122	1855
<b>2004</b>	860	1089	1949
<b>2005</b>	859	1131	1990
<b>2006</b>	915	1149	2064

*Source: CELPA, 2006 Statistics Report*



In the above table one can clearly see that the increase in the production of pulp was used completely to integrate in the paper manufacturing, leaving the Market Pulp figures almost unchanged.

Figure 6 shows that the percentage of integration of pulp is increasing in recent years:



Source: Adapted from CELPA, 2006 Statistics Report

#### 4.4 Portuguese Production and International Trade of Portuguese Pulp Producers

Table 13 presents sales of Market Pulp for the Portuguese pulp producers:

**Table 13**  
**Portuguese Pulp Sales (1000 tonnes)**

(1000 tonnes)	<b>2005</b>	<b>2006</b>
<b>Total Sales</b>	<b>1087</b>	<b>1125</b>
Domestic market	106	106
<i>Exports</i>	<i>981</i>	<i>1019</i>
<i>EU excl. PT</i>	<i>913</i>	<i>978</i>
<i>Rest of World</i>	<i>42</i>	<i>53</i>

Source: Adapted and Expanded from CELPA, 2006 Statistics Report

Sales figures rose by 3, 5% in 2006 compared with 2005. However this aggregated growth doesn't show the different realities. While sales of pulp in the Portuguese market were stable the increasing sales to other European Union countries increased by 7% and to the rest of the world 26 % (despite still being marginal in absolute terms). Domestic sales accounted only for 9, 4 % of total sales.

This is not unusual, as pulp and paper industries in Portugal are typically export oriented industries. This can be acknowledged in Table 14.

**Table 14**  
**Pulp Sales (1000 tonnes)**

	<b>Exports</b>	<b>Domestic</b>	<b>Total</b>	<b>% exports</b>
<b>1990</b>	1045	164	1209	86%
<b>1991</b>	1142	187	1329	86%
<b>1992</b>	1027	152	1179	87%
<b>1993</b>	1044	140	1184	88%
<b>1994</b>	1046	169	1215	86%
<b>1995</b>	950	167	1117	85%
<b>1996</b>	1005	182	1187	85%
<b>1997</b>	1086	81	1167	93%
<b>1998</b>	1037	91	1128	92%
<b>1999</b>	1186	81	1267	94%
<b>2000</b>	1027	81	1108	93%
<b>2001</b>	974	81	1055	92%
<b>2002</b>	1008	100	1108	91%
<b>2003</b>	963	114	1077	89%
<b>2004</b>	1009	142	1151	88%
<b>2005</b>	981	106	1087	90%
<b>2006</b>	1019	106	1125	91%

*Source: CELPA, 2006 Statistics Report*

As shown above the relative importance of exports in Market Pulp segment has been increasing since 1990 consolidating the Paper and Pulp sector as a high net exporter.

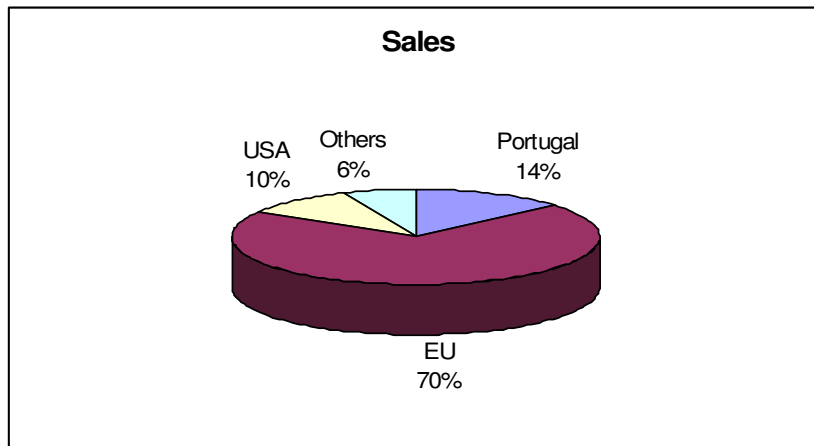
## 4.5 PortucelSoporcel Group

PortucelSoporcel is one of the leading paper producers in the world and the biggest European producer of Bleached Eucalyptus Kraft Pulp (*RISI, 2007*)

In 2007 the Group accounted for 3 % of total Portuguese exports and had over EUR 1.100 Million in sales, employing more than 2000 people. Around 92 % of the total sales come from exports, while the non European Union markets account for 18 % of this figure.

Figure 7 details the sales destinations for PortucelSoporcel in 2007:

**Figure 7**  
**Sales Destinations**



The total installed capacity of the group is 1, 93 million tonnes of paper and 1, 34 Million tonnes for pulp. Around 760.000 tonnes of pulp were integrated in the paper production in 2006. PortucelSoporcel has in place investment plans including a new paper mill in Setubal site a town located 40 kilometers south of Lisbon which will increase the available capacity in 500.000 tonnes up to 770.000 tonnes.

PortucelSoporcel has production capacity in three sites:

- *Figueira da Foz* – One of the biggest industrial sites in Europe and the biggest paper mill in Europe, it has a production capacity of 750.000 tonnes of paper and 550.000 tonnes of pulp fully integrated in the paper production. It is therefore a vertically integrated factory.
- *Setubal* – this site will be the one receiving the biggest Portuguese industrial investment of recent years. The EUR 550 Million investment will increase paper production capacity in Setubal by 500.000 tonnes. The production is expected to start by mid 2009 and the Setubal site will then achieve a paper production capacity of 770.000 tonnes that will integrate the pulp production on the site worth 340.000 tonnes.
- *Cacia* – This site produces a very specialized pulp used on tissue and “décor” paper. All the pulp produced is to be sold in the market.

The Group is also responsible, through their specialized company RAIZ, for the management of 120.000 hectares of forest in Portugal.

### **Commercial representation**

PortucelSoporcel has sales subsidiaries representation / sales offices in USA (Norwalk), Madrid, Verona, Wien, Koln, Amsterdam, Paris and London.

### **Objectives and Strategy**

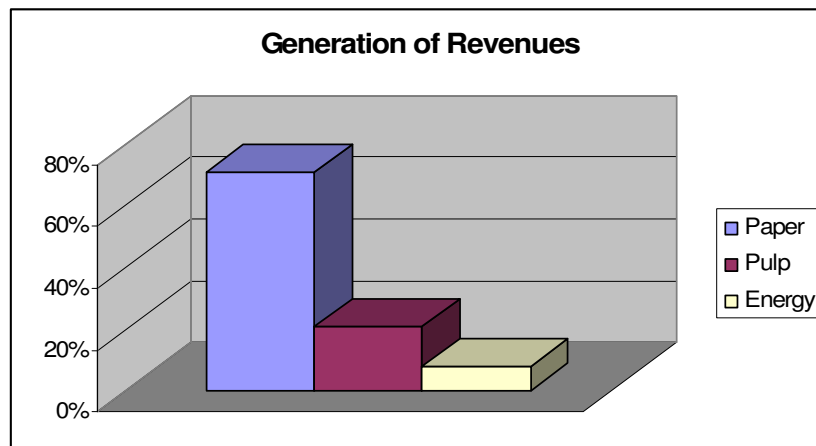
As per the corporate available documents and interviews held in PortucelSoporcel the strategy of the group is to move up on the value chain of paper and pulp markets. The differentiation PortucelSoporcel has been able to create on some of its products – with a very strong highlight on branded office paper (the Navigator) – opens space for the capitalization on this success as well as the perceived quality of the products and the

effective distribution channels which allows serving very demanding markets in terms of quality requirements as is the case of Western Europe. According to the interviews held with key personnel in PortucelSoporcel the main markets will remain Western Europe and United States.

With the ongoing investments on a new paper mill the group expects to achieve productivity gains due to economies of scales and the high technology and flexibility of the new machine. It is also expected that the pulp produced will be increasingly integrated in their own paper production decreasing therefore the market pulp available in world markets. Further 250.000 tonnes per year are expected to be integrated in the paper production.

This trend to focus on paper production while integrating the produced pulp is shown in Figure 8. In addition, Figure 8 also shows contribution of different business areas for PortucelSoporcel Sales.

Figure 8



The group is expected to keep the focus on expansion not only in terms of production (studies being made for new factories in Uruguay, Portugal, Angola or Mozambique), but also to increase/enhance access to raw materials that is backward integration.

Sources: Annual report 2007 ([www.soporcel.pt](http://www.soporcel.pt)); Interviews with Mr. Gonalo Vieira and Mr. Joo Vinagre (Logistics Managers of PortucelSoporcel Group)

## 4.6 Altri Group

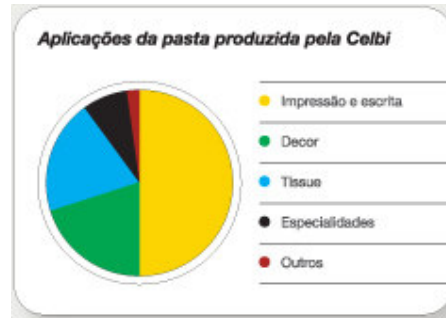
Altri is a diversified group with interests in the pulp and steel industries. The holding responsible for the pulp business is Celulose do Caima SGPS and includes the following companies:

- *Caima – Industria de Celulose* – This production site has capacity to produce 115.000 tonnes of pulp, 95 % destined to the European market.
- *Celbi – Celulose da Beira Industrial* - This factory located near Figueira da Foz was bought in 2006 to Stora Enso for EUR 430 million. It produces pulp to sell in the market and has produced 325.00 tonnes in 2007.  
An industrial investment worth EUR 320 Million is being made on this site to develop capacity with an extra 230.00 tonnes increasing to a total nominal capacity of 550.000 tonnes.
- *Celtejo – Empresa de Celulose do Tejo* – This company produces Unbleached Kraft Pulp and has an installed capacity of 140.000 tonnes. 80.000 tonnes are sold in the market while the remaining 60.000 are integrated in CPK production of sack kraft paper. There are investments to change the capacity and the type of pulp produced. Hence the production is expected to reach 195.000 tonnes of Bleached Kraft already in 2009.
- *CPK – Companhia Produtora de Papel Kraftsack* is the only company of the Group producing paper, namely Kraft sack a type of packaging paper. The total capacity is 60.000 tonnes integrating 60.000 tonnes of pulp produced by Celtejo.

In 2007 the Group's production was 609.00 tonnes of pulp and paper representing sales of 312 Million Euros. The perceived high quality of its pulp is essential taking into account the demanding market Altri Group currently serves that are Western and

Central Europe. The pulp produced in the various sites is used in several end applications as can be seen in Figure 9:

Figure 9



Altri manages over 75.000 hectares of forest area.

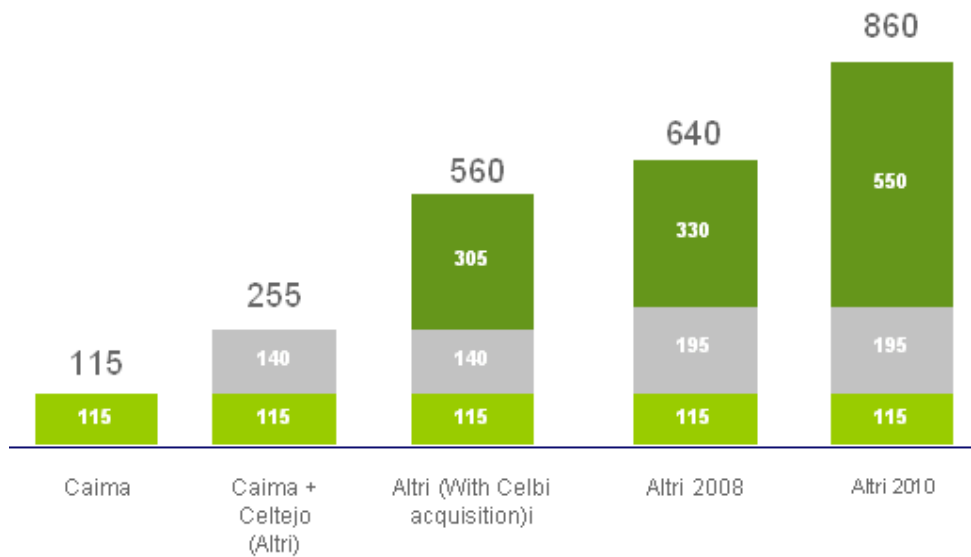
### **Commercial representation**

ALTRI has a sales office in Switzerland responsible for marketing and sales of its products in Western and Central Europe.

### **Objectives and Strategy**

As per the corporate available documents and interviews held in Celbi the strategy of the group is based on the increase of the production capacity in order to take advantage of economies of scale. Celbi will also try to increase sales in the Market Pulp in markets where PortucelSoporcel was active before the new paper mill start producing. As the paper mill will result in more integrated pulp – that previously was being sold in the open market – Celbi targets to replace that cargo. Despite that fact Western Europe was widely stated by company sources as the only strategic geographical target market. The investments being made in Portugal are expected to increase efficiency and market share on the target markets in Europe. The past and future expansion is shown in Figure 10:

**Figure 10**  
**Production capacity in the 3 sites**



The strategy currently emphasizes the following critical success factors:

- **Reduction in cash cost per tonne:** the increased capacity is expected to dilute the fixed costs while achieving economies of scale
- **Strategic location of customers:** Focus in Western Europe to increase service levels at a minimum transportation costs
- **Wood self sufficiency:** Increase self sufficiency in wood, historically around 50%

Sources: CELBI website ([www.celbi.pt](http://www.celbi.pt)); Interviews with Mr. Hermano Sousa (Logistics Manager of Celbi, Altri Group)



## 5. A Comprehensive Analysis of the Global Market Pulp

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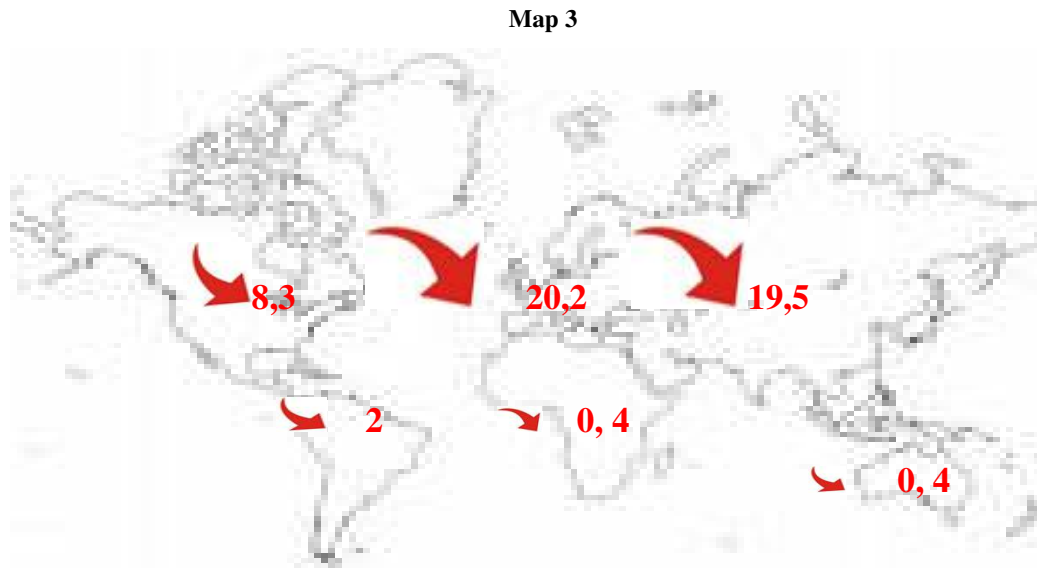
*In this chapter Market Pulp segment is analysed. It emphasizes the relative importance of Market Pulp in the Paper and Pulp industries and scans the main companies competing on this market. It describes how prices are determined and how demand factors are created.*

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In 2006 total world pulp production was 192 Million tonnes from which around 140 Million tonnes were to be integrated in the production of paper in paper mills owned by the same company – an integrated paper company – with the remaining 52 Million being sold in the open market that is the Market Pulp (*Market Pulp Association, www.pppc.org*)

### 5.1 Market Pulp Main Importing Regions

Map 3 discriminates the imports of Market Pulp in 2005 per geographical region (in million tones):



*Source: Adapted from PPPC, 2007*

Table 15 presents the compounded average annual growth rate for imports over the period from 2000 to 2005:

**Table 15**  
**Market pulp imported by region 2005**

(10 <sup>5</sup> tonnes)	<b>Quantity</b>	<b>Compound Annual growth 2000-2005</b>
Europe	20,2	3,5%
Asia & Africa	19,9	7,6%
North America	8,3	1,0%
Latin America	2	2,1%
Oceania	0,4	2,0%
<b>Total</b>	<b>50,8</b>	

*Source: Adapted from PPPC, 2007*

As shown, Europe is still the main importer of market pulp with an annual growth rate of 3, 5 %. Asia is by far the fastest growing importer of Market Pulp with a growth rate that more than doubles the European one (7,6%) and in absolute terms almost catching up with total imports in Europe (difference of 300.000 tonnes). The growth on imports of Market Pulp into North America is stagnant while in Latin America and Oceania is below average. This is an indication that local production covers most of the needs (Latin America and to a certain extent North America) or that paper industry (or production facilities) is shifting to other continents (North America).

## 5.2 Market Mechanisms

### 5.2.1. Pricing

Market pulp is the only commodity, understood and traded as such, in the paper industry (*PulpWatch, 2007*). All other products globally have different levels of differentiation but have as the main productive input, pulp - produced internally or

bought as market pulp. Therefore market pulp cost (price) is a key element on the pricing structure of the whole paper value chain.

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The market pulp pricing is freely established by each producer, but the base for the pricing formation is the real trade information collected by companies providing auditing and indexes for the industry (*RISI, 2007*). The main company that issues such indications and indexes is the Finnish FOEX by collecting trade information from buyers, sellers, traders and agents on a weekly basis.

It can be argued that these indicators are widely used and understood as the market price. This is also due to the fact that all the pulp produced is likely to be placed in the market due to the scarcity of installed capacity and the growth rate of paper and pulp consumption, as shown in previous tables (see Table 4).

The several producers are then able to adjust their offers based on their cost structure, on the quantity sold and on the customer relation such as in any other business. The difference is that the final price is then derived from the initial indexes with the respective rebates, rappel or discounts usually not turned public.

It can be stated that despite being a global industry (or due to that) with several business transactions spread all over the world, it is possible to establish a base in which market pulp producers can forecast their revenue or the integrated paper producers can use for their transfer price (*PulpWatch, 2007*)

### **5.2.2 Production Costs**

The production costs are a critical factor for the success of the pulp producing companies, even more because it is difficult to differentiate the product, as this is seen essentially as a commodity (*PulpWatch, 2007*).

There are different production costs depending on several factors. Nevertheless it is widely acknowledged that the two most important single factors are:

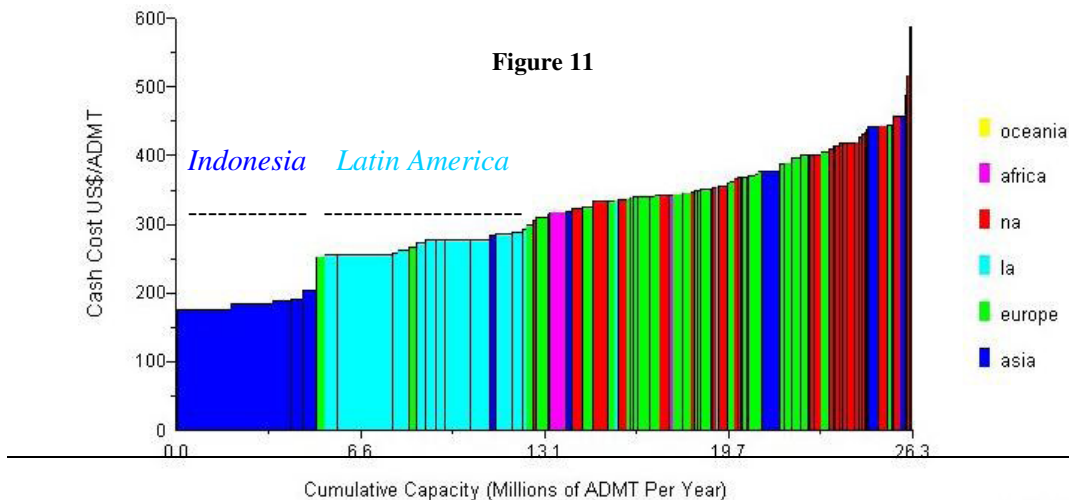
- 
- *Paper mill / machine capacity – productivity*
  
  - *Access to raw materials*

It can be observed that the investments being made are essentially on new paper mills with high productivity in terms of speed and flexibility of production and with a very high capacity – on the range of 0,5 million to 1 million tonnes. The production cost curve is steep and there are clear economies of scale allowing achieving production cost advantages (*RISI, 2007*)

The access to raw materials – mainly wood from pine and eucalyptus – is the other main success factor as it is not only important to have available raw materials near the production sites in order to minimize transportation costs but also to have an available stock of forest in preparation for future production. Therefore the investments being made by North European companies in locations such as Brazil have that in mind as there are several thousands of hectares for nurturing, growing and developing (*StoraEnso, 2007*). In this context, the substitution rate of used land/forest is an important factor to take into consideration. On this factor Asia and South America have competitive advantages in relation to Europe.

In fact it takes 4 years in Indonesia, 6 years in Brazil and almost 20 years in Europe to achieve a state where hardwood can be used for producing pulp (*APRIL, 200*).

According to the production costs presented in Figure 11, the Asian and South American plants have a major advantage compared to the ones located in Europe or in North America.



Source: RISI Benchmarking services taken from APRILASIA website ([www.aprilasia.com](http://www.aprilasia.com))

### 5.3 Market Pulp Producers

It is important to consider that the producers/sellers of market pulp also include integrated paper companies that not only produce pulp to integrate in their own paper producing process but also sell the excessive production capacity in the open market. Examples of these integrated paper companies, producing both integrated and market pulp, are PortucelSoporcel ([www.portucelsoporcel.pt](http://www.portucelsoporcel.pt)), CMPC ([www.cmpc.cl](http://www.cmpc.cl)), Weyerhaeuser ([www.weyerhaeuser.com](http://www.weyerhaeuser.com)), StoraEnso ([www.storaenso.com](http://www.storaenso.com)), Georgia Pacific ([www.gp.com](http://www.gp.com)), International Paper ([www.internationalpaper.com](http://www.internationalpaper.com)) and UPM ([www.upm-kymmene.com](http://www.upm-kymmene.com)) among others. It is not unusual that these integrated paper companies sell pulp in the market while also buying pulp. This kind of behavior depends on the location of the production sites, the type of pulp produced and trading/tactic decisions based on pricing (*PulpWatch 2007*).

The majority of the Market Pulp is nevertheless produced by companies specialized in pulp production. They sell their total output to paper companies that are not integrated or to integrated paper companies that are unable to produce enough pulp (or the correct type of pulp) to integrate in their paper producing process. Main examples of pulp

producers not vertically diversified into paper production include Aracruz ([www.aracruz.com](http://www.aracruz.com)), Arauco ([www.arauco.cl](http://www.arauco.cl)) and Celbi ([www.celbi.pt](http://www.celbi.pt)).

It is widely accepted that pulp production is a highly capital intensive industry where economies of scale is a key success factor and therefore it is a very concentrated industry. On the Market Pulp sub-segment total sales in 2006 accounted for around 52 Million tonnes. Current installed capacity is 54 Million tonnes with the biggest 35 world companies on this sector representing 81 % of the total. The total capacity that each company owns, by type of pulp produced, is depicted in Table 16:

**Table 16**  
**The largest market pulp producers, ranked by total capacity**

								% of		
		BSKP	BHKP	SP	UKP	Mech	Total	total		
(1000 tonnes)								capacity	Cumulative	
1	Aracruz	Brazil	-	3.160	-	-	-	3.160	5,8%	5,8%
2	Arauco	Chile/Argentina	1.590	870	-	365	-	2.825	5,2%	11,0%
3	Metsa Botnia	Finland	1.010	1.260	-	-	-	2.270	4,2%	15,2%
4	Sodra	Sweden/Norway	1.475	465	-	-	100	2.040	3,8%	18,9%
5	APRIL	Indonesia	-	1.990	-	-	-	1.990	3,7%	22,6%
6	Canfor	Canada	1.440	-	-	120	215	1.775	3,3%	25,9%
7	CMPC	Chile	660	1.080	-	30	-	1.770	3,3%	29,1%
8	Weyerhaeuser	USA/Canada	1.760	-	-	-	-	1.760	3,2%	32,4%
9	Tembec	Canada/France	700	300	-	-	760	1.760	3,2%	35,6%
10	Stora Enso	Nordic	880	835	-	-	-	1.715	3,2%	38,8%
11	Suzano Bahia Sul	Brazil	-	1.540	-	-	-	1.540	2,8%	41,6%
12	Domtar	Canada/USA	985	525	-	-	-	1.510	2,8%	44,4%
13	Ilim Pulp	Russia	875	495	-	50	-	1.420	2,6%	47,0%
14	Georgia Pacific (Koch)	USA	1.405	-	-	-	-	1.405	2,6%	49,6%
15	Mercer International	Germany/Canada	1.345	-	-	-	-	1.345	2,5%	52,0%
16	West Fraser	Canada	715	-	-	-	570	1.285	2,4%	54,4%
17	International Paper	USA	835	390	-	-	5	1.230	2,3%	56,7%
18	APP	Indonesia/China	-	850	-	-	330	1.180	2,2%	58,8%
19	ENCE	Spain	-	1.160	-	-	-	1.160	2,1%	61,0%
20	Cenibra	Brazil	-	1.140	-	-	-	1.140	2,1%	63,1%
21	Bowater	Canada/USA	685	370	-	-	-	1.055	1,9%	65,0%
22	Votorantim	Brazil	-	1.005	-	-	-	1.005	1,8%	66,9%
23	Parsons & Whitemore	USA	575	365	-	-	-	940	1,7%	68,6%
24	Pope & Talbot	Canada/USA	830	-	-	-	-	830	1,5%	70,1%
25	Rottneros	Sweden/Spain	200	150	-	30	365	745	1,4%	71,5%

26	UPM-Kymmene	Finland	250	400	-	-	-	650	1,2%	72,7%
27	Heinzel	Austria	365	-	275	-	-	640	1,2%	73,9%
28	Alberta Pacific	Canada	70	540	-	-	-	610	1,1%	75,0%
29	Altri (Celbi, Caima, Celtejo)	Portugal	-	320	115	140	-	575	1,1%	76,1%
30	Portucel	Portugal	-	570	-	-	-	570	1,0%	77,1%
31	Daishowa	Canada/Japan	120	360	-	-	25	505	0,9%	78,0%
32	Catalyst	Canada	468	-	-	-	-	468	0,9%	78,9%
33	Donghae	Korea	-	450	-	-	-	450	0,8%	79,7%
34	SFK Pulp Fund	Canada	375	-	-	-	-	375	0,7%	80,4%
35	Millar Western	Canada	-	-	-	-	305	305	0,6%	81,0%
Total 35			19.613	20.590	390	735	2.675	44.003		
% of total 35			84,2%	85,4%	43,1%	30,5%	73,9%	81,0%		
<b>World total</b>			<b>23.301</b>	<b>24.105</b>	<b>905</b>	<b>2.413</b>	<b>3.620</b>	<b>54.344</b>		

Source: Hawkins Wright December 2007

Several important remarks can be highlighted from the figures presented above:

- Bleached Pulp accounts for 74 % of total Market Pulp
- Bleached Softwood and Bleached Hardwood Pulp have very similar total production capacity (23.3 Million tonnes and 24.1 Million tonnes respectively accounting for 36.1 % and 37.9 % of total market pulp)
- Biggest companies and production sites are in America with 6 out of the 10 biggest companies (3 from Latin America – Aracruz, Arauco and CMPC – 3 from USA/Canada – Canfor, Weyerhaeuser and Tempec)
- 40 % of the top 35 companies produce both Softwood Pulp and Hardwood Pulp while 60 % choose to produce only one kind of Bleached Pulp (Softwood or Hardwood).
- Only 6 out of the 35 top producers have Unbleached Kraft Pulp on their product portfolio (UKP represents only 1.35 % of total market pulp capacity)
- 9 out of the 35 producers (25 %) still produce pulp mechanically despite mechanical pulp is the most produced type pulp in only one of them (Canadian Millar Western).

The study will now proceed by aggregating the same data geographically. Table 17 put forward the total production, number of companies, installed capacity and relative importance of these companies by region.

**Table 17**  
**Capacity and number of Companies per Region**

<b>Region</b>	<b>Capacity (1000 tonnes)</b>	<b>Companies</b>	<b>% total capacity</b>	<b>%total companies</b>	<b>Capacity per company</b>
<b>North America</b>	15.813	15	35,9%	42,9%	1.054
<b>Latin America</b>	11.440	6	26,0%	17,1%	1.907
<b>Northern</b>					
<b>Europe</b>	10.825	8	24,6%	22,9%	1.353
<b>Asia</b>	3.620	3	8,2%	8,6%	1.207
<b>Southern</b>					
<b>Europe</b>	2.305	3	5,2%	8,6%	768
<b>Total 35</b>	<b>44.003</b>	<b>35</b>	<b>100,0%</b>	<b>100,0%</b>	<b>1.257</b>

*Source: Adapted and Expanded from Hawkins Wright December 2007*

From Table 16 it can be seen that North America, despite all the sites closed over the current and last decade, is still the main producing area in terms of market pulp with around 36 % of total installed capacity. Latin America follows with 26 % and Northern Europe comes next with 25 %. Asian companies have 8 % of total installed capacity on this segment while Southern Europe (Spain and Portugal) holding 5 %. If one add Southern Europe to Northern Europe we have Europe with higher capacity than Latin America (29, 8 % Vs 26 %).

Looking at the relative importance of the number of companies in each region one gets a different insight. While North America is worth 36 % of total installed capacity (within the top 35 companies), it has 43 % of the total companies. Latin America has only 17% of total companies but accounts for 26 % of total capacity. Asia and Northern Europe have, on average, the percentage of the capacity matching more or less the



percentage of companies within the top 35. In Southern Europe, just like it happens in North America, it can be noticed again that the number of companies is relatively higher than the capacity (8% of the companies worth only 5% of total capacity).

The above figures led the researcher to analyze the average capacity per company on the top 35 list in each geographical area. Latin America is now the first with 1.9 Million tonnes capacity, per company. Northern European companies have on average 1.35 Million tonnes capacity while Asian companies have 1.2 Million tonnes. USA and Canadian companies have only 1 Million tonnes capacity for market pulp on average while Southern Europe lags behind with just 0.77 Million tonnes of installed capacity.

Once this industry is very capital intensive, economies of scales and technology play a very important role for companies. Therefore it is accepted that the most recent geographical areas that come to “play” in the pulp arena are the ones that were able to surpass the most ancient ones. The greenfield investments made by Brazilian and Chilean companies are all of enormous proportions (900.000 tonnes market pulp capacity just initiated by Brazilian Suzano or the investments made by Votorantim on its Projecto Horizonte of extra 1, 3 Million tonnes, are only some examples).

In the same vein, Northern European countries have an higher than average capacity per company as shown in Table 17 and the same is due to investments in major production lines in South America. Number three Metsa Botnia has just started to operate a mega production line of 1 Million tonnes capacity in Uruguay while StoraEnso has a joint venture with Aracruz on the Veracel mill with capacity for 900.000 tonnes.

These geographically diversified investments by European companies derive also from one critical factor which is the need to access raw material, more specifically wood. In South America they have access to large portions of forest no longer available in Europe (specially if needed to “feed” such large production lines) and at the same time they minimize the risk of sourcing from less reliable countries such as Russia, that despite having the largest forest area in the world, follows a tax policy that heavily burdens the export of raw timber. (*Wahlstrom, Widmark, 2007*)

This being said it can then be stated that the Market Pulp segment of the industry is highly concentrated as the competitiveness of the companies depends to a great extent on the economies of scale that they are able to achieve. The investment in new technology will enable these companies in increasing production while minimizing waste.

#### **5.4 Competition Analysis**

The study will now selectively and briefly analyze some players on this sub-segment of the Paper and Pulp industry: Market Pulp. Seven companies were selected on the following criteria:

1. Being in the top 35 list of Market Pulp producers
2. Representing both the “new” and “old” world in this industry
3. Producing mainly Bleached Hardwood Kraft like the Portuguese Companies
4. Have initiated or have been undergoing major investment plans
5. Several different mission, visions and strategies represented

The seven companies analyzed below represent a total Market Pulp capacity of 25 % of total installed capacity. Adding the Portuguese companies Altri and PortucelSoporcel described in more detail, 27 % of the total world capacity is included. They will be analyzed from the highest to the lowest installed capacity.

The analysis include companies which have made major greenfield investments in operational capacity and in natural resources in South America including European companies that have had to find natural resources and aim to decrease production costs as well as companies with a more limited production capacity and focusing more on local markets.

### **5.4.1 Aracruz Fact Sheet:**

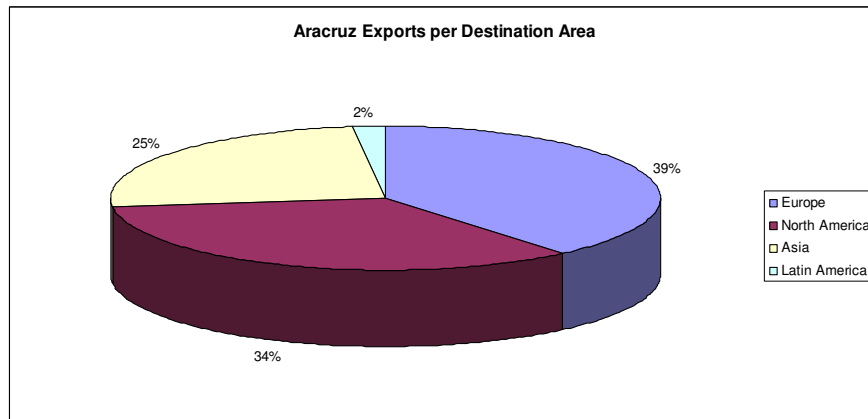
Aracruz was founded in 1972 and is the world's leading producer of bleached eucalyptus pulp with a market share of 27 % and it is at the same time the company with highest installed capacity for market pulp. It manages 279.000 hectares of eucalyptus plantation in Brazil.

Aracruz has a total production capacity of 3 Million tonnes split up by the following pulp mills:

- *Barra do Riacho* in Espirito Santo state – 2.1 Million tonnes. This is considered the largest and most advanced pulp mill in the world (further 200.000 tonnes expansion ongoing)
- *Guaíba* in Rio Grande do Sul – 430.00 tonnes (there are plans to expand further 1,4 Million)
- *Veracel* in Bahia state – this mill is a joint venture between Aracruz and European StoraEnso with the 50% stake of each corresponding to a capacity of 450.000 tonnes. The investment on this site amounted to USD 1, 25 Billion and has an annual capacity of 900.000 tonnes. It opened in 2005 and started producing at cruise speed during 2007.

Aracruz production in 2006 is almost oriented towards exports (98%) as can be seen in Figure 12:

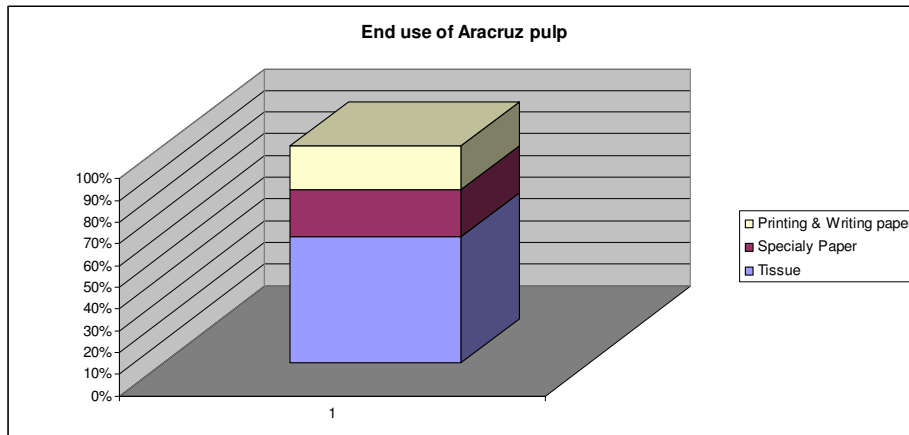
**Figure 12**



Aracruz also produces 50.000 tonnes of writing and printing paper to supply the Brazilian market.

The pulp sold by Aracruz in the market is aimed to several end use applications. In 2006 the pulp sold ended up on the types of paper products stated in Figure 13:

**Figure 13**



### **Commercial Representation**

Aracruz has representative offices in the United States, Switzerland, Hong Kong and China.

### **Aracruz Mission**

To offer products obtained in a sustainable way from planted forests, generating economic, social and environmental benefits and, therefore, contributing to people's well-being and quality of life.

### **Aracruz Vision:**

To be acknowledged as leader in the global pulp market

### **Objectives and Strategy**

Aracruz has the goal to supply 25 % of the world demand for hardwood pulp – 7 Million tonnes – in the next ten years which will mean doubling the present installed capacity. Plans are ongoing to expand and renew present production lines in order to increase capacity and operational efficiency.

Aracruz is investing in natural resources to increase the flow of raw materials needed for the pulp production and is also investing in logistic infrastructure as a dedicated port to expedite the commodity.

*Source: Adapted from Corporate Website ([www.aracruz.com](http://www.aracruz.com))*

### **5.4.2 Arauco Fact Sheet:**

Celulosa Arauco resulted from the merger of two companies in 1979: Industrias Arauco and Celulosa Constitucion. Both had been created 20 years before by the Chilean government with the aim to develop forest resources, improve soil quality and promote employment.

Today Arauco is the biggest Chilean company in the industry and the second worldwide on the Market Pulp sub-segment.

Arauco produces both Softwood pulp, from pine, and hardwood pulp, from Eucalyptus. Its forestry resources cover 930.000 hectares with plantations (Pine representing 87% and eucalyptus the remaining 13%) in Chile, Argentina, Uruguay and Brazil

Since the opening of the *Nueva Aldea* Forestry-Industrial complex Arauco has 3 Million tonnes producing capacity for Market Pulp. It produces Bleached (89 % of total) and Unbleached Kraft Pulp (11%).

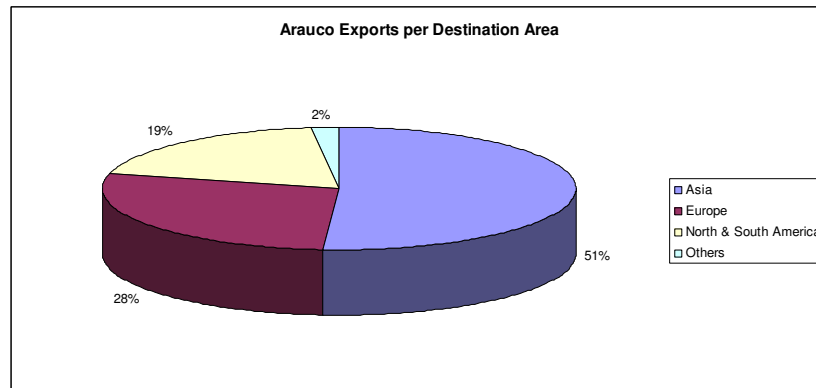
Arauco operates 5 mills in Chile and one in Argentina, the *Alto Paraná* mill:

- *Arauco Mill*: Two lines with a total production capacity of 790.000 tonnes of Bleached Softwood and Hardwood Kraft Pulp
- *Constitution Mill*: capacity of 355.000 tonnes of Bleached Softwood Kraft Pulp
- *Licancel Mill*: capacity of 140.000 tonnes of Bleached Softwood and Hardwood Kraft Pulp
- *Valdivia Mill*: opened in 2004 with a capacity of 550.00 tonnes of Bleached Softwood and Hardwood Kraft pulp
- *Nueva Aldea Mill*: capacity for 856.000 tonnes of Softwood and Hardwood Kraft pulp
- *Alto Paraná Mill*: in Argentina, it has capacity for 350.00 tonnes of Bleached Softwood Kraft pulp

Both the Valdivia and Licancel sites have been suffering from interruptions and suspension since 2006 due to environmental issues with estimated losses of USD 1 Million per day during 2006, according to company sources (Annual report 2006)

91 % of the production is exported with more than half of the exports going to Asia (51%). See Figure 14 with destinations of pulp sales:

**Figure 14**



### **Commercial Representation**

Arauco has commercial offices in Chile, Argentina, Peru, Mexico, Brazil, USA, Canada and Japan and exports to 60 countries worldwide.

### **Arauco Vision**

To be a global leader in sustainable forestry and forest products development.

### **Objectives and Strategy**

Arauco aims to be the global leader on the Market Pulp sub-segment and has invested accordingly to increase capacity to the 3 Million tonnes level. It has a strong position in Asia, the fastest growing market due to its geographic location on the Pacific. Important investments were and are still being made on the forestry side not only on increasing the resources but also on research and development to increase efficiency of its natural resources.

*Source: Adapted from Corporate Website ([www.arauco.cl](http://www.arauco.cl))*

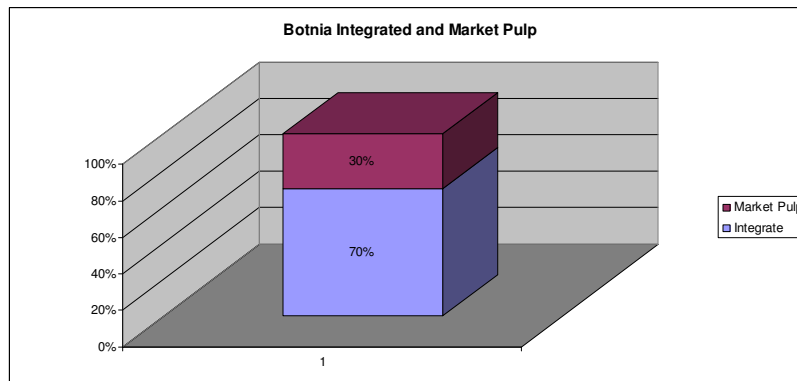
### **5.4.3 MetsoBotnia Fact Sheet:**

MetsoBotnia belongs to Metsäliitto Group (that owns 53%) and to UPM (remaining 47%) making therefore part of conglomerate groups that also have integrated paper production and are well diversified such as UPM, M-Real and Metsa Tissue.

Botnia initiated activities with its present name 30 years ago but the oldest part of Botnia, Kemi Osakeyhtiö, was founded more than 110 years ago. Traditions are old and numerous in Joutseno mills founded in 1908.

Botnia has a bleached pulp production capacity of 2.7 Million tonnes making it one of the biggest in the world on the pulp segment. In 2006 it sold 2, 5 Million tonnes from which 1, 6 were sold to other companies of the group and the remaining 900.000 tonnes were to sell in the open market mainly to European paper products producers as stated in Figure 15.

**Figure 15**  
**Integration vs. market pulp**



Botnia produces pulp made from both softwood and hardwood, representing respectively 70 and 30 % of the production.

This balance will change with the opening of the Uruguayan *Frey Bentos* mill that will have capacity to produce 1 Million tonnes of Bleached Hardwood Kraft Pulp. *Frey Bentos* initiated activities in November 2007 and is now already at full production. The investment amounted to USD 1, 1 Billion.



Most of the wood used by Botnia on its present production sites is from Finnish forests including the ones managed by its forest management subsidiary that has 160.000 hectares to care for. Around 16% of the total is imported from Russia and Baltic.

### **Commercial representation**

Botnia has own representation offices dedicated to pulp sales in Germany, France and China.

### **Objectives and strategy**

Botnia is part of a larger group with all the arising consequences. As stated before, the majority of the pulp produced is to integrate on the paper production process of other companies of the group, but an important part is still to be marketed outside. To prove their commitment to expansion and operational efficiency a major investment has been made in South America which will increase the available capacity with much lower production costs and widely possible access to raw material – wood.

Environmental and ethical commitments are also part of Botnia's values which are clearly and heavily stated on its corporate information and advertising.

*Source: Corporate Website ([www.botnia.com](http://www.botnia.com))*

### **5.4.4 APRIL Fact Sheet:**

Asia Pacific Resources International Holding (APRIL) was formed in 1994 and has headquarters in Singapore. It is a privately owned company with very concentrated ownership structure.

APRIL owns Riau Andalan Pulp and Paper Co which operates one of the largest pulp mills in the world with capacity of 1, 75 Million tonnes. Total capacity of the company

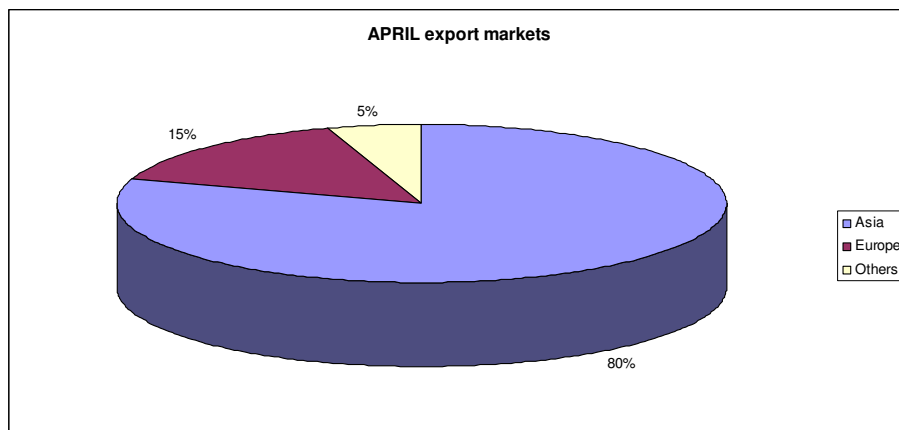
is 2 Million tonnes of pulp and 350.000 tonnes of paper and cardboard. To this total capacity contributes the recently bought Chinese pulp and paper producer Shandong Rizhao SSYMB Pulp and Paper Co with capacity to produce 220.000 tonnes of pulp and 170.000 tonnes of cardboard.

It has therefore manufacturing operations in Indonesia and China, producing Bleached Hardwood Kraft Pulp but made from Acacia and not Eucalyptus, as usual in Latin America and Southern Europe.

APRIL develops 264.000 hectares of forest, owning 149.000 hectares.

APRIL exports most of its production to Asia, with China being the biggest market followed by Korea, Indonesia, India, Taiwan and Japan. Figure 16 shows main export markets per geographical area

**Figure 16**



APRIL has an estimated market share in Korea of 30 % and in China of 20 % according to the company statements.

### **Commercial representation**

APRIL has own representation in China, Switzerland, Vietnam, Japan, Taiwan, India and South Korea.

## **APRIL Vision**

To be one of the largest, best managed and sustainable pulp and paper companies in the world and be a preferred supplier to its customers and the preferred company to its people.

## **Objectives and Strategy**

The company has suffered severe strains from environmental pressures and that has been at the core of its concerns over the last two years. Its damaged image is being changed with the latest changes in production lines and increased dialogue with local inhabitants.

The core of the strategy is to target the fast growing Chinese market while maintaining low cost of operations. This low cost of operations is also enhanced by the natural resources which grow faster than anywhere else in the world due to climate conditions (see Figure 10). The recent acquisition of a Chinese pulp and paper producer is part of the objective to increase market share in China.

*Source: Corporate Website ([www.aprilasia.com](http://www.aprilasia.com))*

### **5.4.5 Suzano Papel e Celuloses Fact Sheet:**

Suzano has its origins in the 30s of last century when one man, Leon Ferrer, invested his entire savings on a small paper factory. The Second World War resulted in tremendous difficulties for the imports of paper which resulted nicely for Leon Ferrer's activities.

The growth in the 50s, 60s and 70s was tremendous with diversifications into chemicals and petrochemical industries. Nevertheless paper has always been the core business and

Suzano opened its capital to the public in the 80s being the first Brazilian company in the industry to do so.

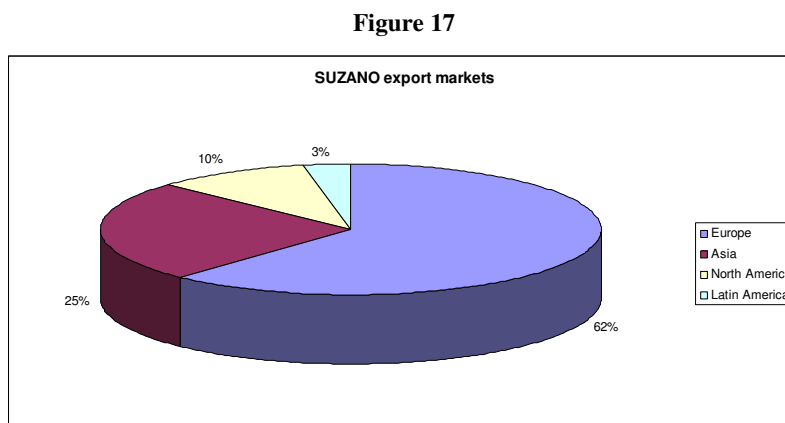
Suzano is now an integrated paper producer manufacturing products from pulp to printing and writing paper passing by carton board and paper board. It owns and manages a forest area of 190.000 hectares of Eucalyptus in Brazil.

Suzano produces annually 1, 1 Million tonnes of paper and 1, 5 Million tonnes of pulp.

Being an integrated company Suzano absorbs part of its pulp production on its paper manufacturing process but still sells around 615.000 tonnes of market pulp per year. This will further increase due to its *Mucuri* new mill project where an investment of USD 1, 3 Billion will result short term into an extra capacity of 900.000 tonnes of market pulp.

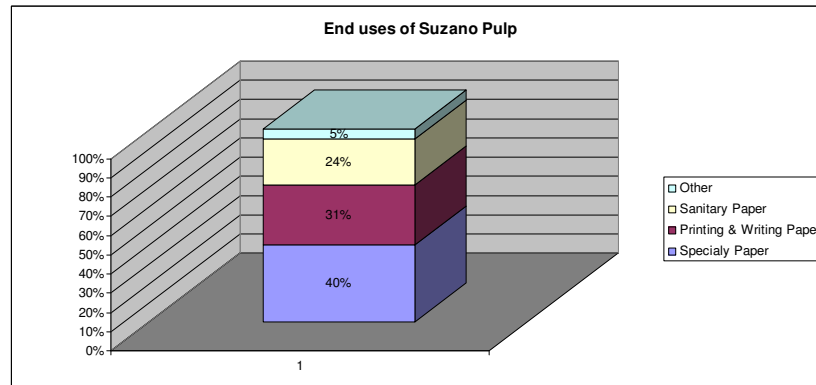
The *Mucuri* complex will then have two production lines: One with 650.000 tonnes and the second line, initiated in 4<sup>th</sup> Quarter 2007, with 1 Million capacity which will be able to reach, when in cruise speed, 1,1 Million tonnes (expected end 2009)

Suzano exports 78 % of its total production and its main exports markets can be seen in the Figure 17 below with Europe absorbing 62% of Suzano external sales:



The end uses of the pulp sold by Suzano in 2006 were specialty paper, printing and writing paper and sanitary paper as can be seen in Figure 18

**Figure 18**



### **Commercial representation**

Suzano created subsidiaries in North America, Europe and Asia to commercialize its products.

### **Objectives and Strategy**

While expanding capacity with a major pulp producing line, Suzano is a well diversified company and it is part of the strategy to take advantages on the existing synergies. A major example is the increase of integrated pulp. Nevertheless, and due to the high capacity installed and the natural resources it manages, Suzano will continue to be in the future one of the major companies on the market pulp sub-segment.

*Source: Corporate Website ([www.suzano.com.br](http://www.suzano.com.br))*

### **5.4.6 ENCE Fact Sheet:**

ENCE is Europe's biggest owner of eucalyptus forest, European leader and second in the world on the production of eucalyptus based pulp.

This company was founded in 1957 endorsed by public funds and strategy. It was partially privatized in 1989 and since 2001 the majority of equity has been on the stable hands of private companies including banks.

ENCE manages 140.000 hectares of forest in South America and Iberia Peninsula including 53.000 in Uruguay since 1998. It has a self sufficiency in wood of around 30 % which is higher than the European average

ENCE has the installed capacity to produce 1, 05 Million tonnes of Bleached Hardwood Kraft Pulp on its three mills in Spain:

- *Huelva* – 365.000 tonnes capacity from which 30 % sold in domestic market and 70 % exported
- *Navia* – 300.000 tonnes capacity from which 30 % sold in domestic market and 70 % exported
- *Pontevedra* – 380.000 tonnes capacity from which 90 % is exported.

ENCE is the number one pulp supplier in the Spanish market, where 22 % of its production is sold. Other major markets are Central and Northern Europe (Germany, Switzerland, Austria, Scandinavia and Benelux) accounting for 44 % of total sales. Europe represents the vast majority of ENCE sales (around 95 %)

### **Commercial representation**

ENCE created the ENCELL subsidiary in UK to commercialize its products.

### **Objectives and Strategy**

On its strategic plan, and backed by the interview held, ENCE states the goal to achieve a production capacity of 2, 3 Million tonnes from present capacity of 1, 05 Million. This will be done by increasing capacity in Spain by 250.000 tonnes and start producing in Uruguay 1 Million tonnes on its new plant. Production in Uruguay is expected to start in 2009 with full production in 2010. This means investments of EUR 270 Million in

Spain and EUR 930 Million in Uruguay. While production in Spain will continue to be exported to European markets the production in Uruguay will not only target European markets but it also aims to target fast growing Asian markets.

*Source: Corporate Website ([www.ence.es](http://www.ence.es)), Interview with Mr. Pedro Amaral (Controlling Department of Iberflorestal, Ence Group)*

#### **5.4.7 Donghae Fact Sheet:**

Established as a government funded enterprise and privatized in 1988, today it is a listed company in Korea Stock exchange.

It produces Bleached Kraft Pulp on its two production lines that total 450.000 tonnes capacity.

It produces 20% of the demand in Korean market, which is by far its most important market.

Donghae owns and manages: 2000 hectares in Korea and overseas

#### **Commercial representations**

Donghae does not have a dedicated sales office overseas

#### **Mission**

Stabilize the supply of chemical pulp to the domestic paper manufacturer

## **Objectives and strategy**

Under bank receivership since the Asian financial crisis in 1997 it is presently for open sale. Integrated paper producer Moorim Paper acquired Donghae and hence plans to integrate the pulp on its paper production. This means less pulp market in the near future especially after new paper mill capacity comes into production in 2011.

*Source: Corporate Website ([www.donghaepulp.co.kr](http://www.donghaepulp.co.kr))*

## **5.5 Demand for Market Pulp**

Demand for market pulp derives directly from the primary demand of paper products. As stated previously, around 50% of the input to produce paper is pulp and therefore the demand of paper products is the single most important component for the demand of pulp.

In order to better foresee where the business opportunities in this sub-segment are more likely to arise, this dissertation needs to identify which the single most important aggregated component/index affecting the demand for the final end products.

Several empirical studies – Katenberg and Bungiorno (1986), Zhang and Buongiorno (1997), Chas-Amil and Buongiorno (2000), Hetemaki and Obersteirner (2001) and Hetemaki and Nilson (2005) – give evidence that the consumption of pulp and paper products has a positive correlation to the Gross Domestic Product (GDP).

Some of the studies have been made with a global focus while others decomposed the analysis to the several geographic regions. Nevertheless all of them give evidence **that the demand per capita of paper depends directly on the GDP per capita**. Other factors are also mentioned as impacting the demand of paper but evidence is given that the impact is marginal and that GDP per capita – and its developments – is the base for the demand of paper. There is a different impact of the GDP development on Paper and Pulp demand on short and long term. Therefore while on short term the studies have resulted in correlation figures for different paper products from 0.18 to 0.39 in Western



Europe (*Chas-Amil and Buongiorno, 2000*), in the long run the studies point to a more effective result with figures from 0.41 to 1.07 in Europe (*Chas-Amil and Buongiorno, 2000*) and 0.69 to 1.36 in the United States (*Katenberg and Bungiorno, 1986*)

This explains why paper and pulp consumption per capita in regions such as Western Europe and North America are higher than in other regions of the world.

It also explains why the growth of the demand/consumption is higher in regions such as China, South East Asia, Eastern Europe, India and South America as in these areas GDP is growing faster than in North America or Western Europe.

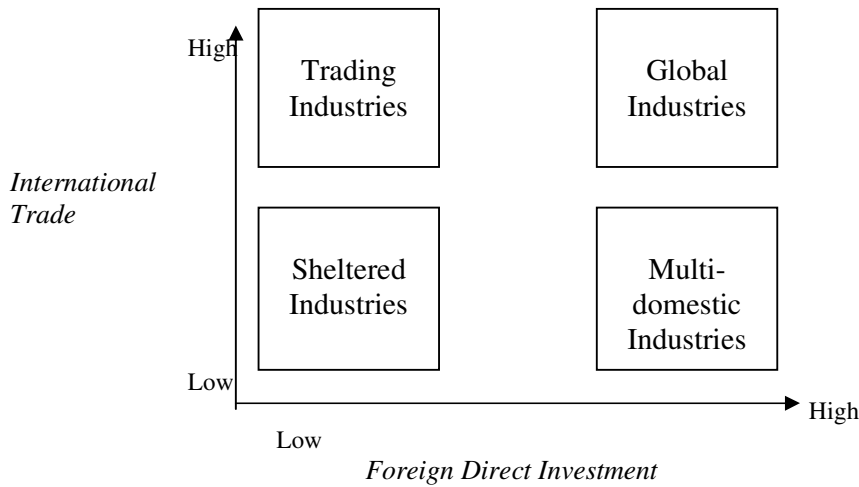
These results match the information shown in previous chapters of this study and will allow to confirm the research forecasts on where the consumption will be the highest and where the growth will come from and therefore where the business opportunities will tend to be more profitable.

### **5.6 Pattern of Internationalization for the Market Pulp Industry**

The relevant literature acknowledges that internationalization occurs either through trade that is the sale and transportation of products and services across national boundaries, or through direct investment, by building or acquiring operating assets in a foreign country.

Based on this approach, and for specific industries, four different patterns of internationalization can be identified that are: Sheltered industries, Trading industries, Multidomestic industries and Global industries (see Figure 19)

**Figure 19 - Patterns of Industry Internationalization**



Source: Grant (2008)

In this context the pulp market can be defined as a trading industry, where internationalization occurs mainly through exports and imports. In fact pulp is a transportable product, where economies of scale are key, and exporting from a single location site (often the home market) seems to be the most efficient way to expand to foreign markets.

However in recent years one can notice a shift towards an increasing level of foreign direct investment (FDI) in order for major players to gain access to raw materials or to final customers.

Nonetheless Market Pulp is still mainly a *trading industry* in the sense that the major players are internationalized based on a single production site, usually on the home country, and actively search for new markets to export. This situation is mainly due to the following factors:

- the existent economies of scale push the production facilities to be concentrated,
- the relatively low transportation costs
- the product is not extensively differentiated

- governmental support to the Paper and Pulp industries based on their importance to the trade balance and qualified employment.

However, recently, Market Pulp suppliers are shifting their strategies towards increasing direct investment in foreign countries. Main reasons are the following:

- exploitation of production opportunities by locating production facilities where efficiency can be increased
- to gain access to raw material (forests)
- to take advantage of support programmes set out by local Governments (specially tax related)

In sum the decisions of FDI in the Pulp market are often not based in locating the production site near the final consumer but rather based on factors related to the supply of raw materials and governmental drivers (financial assistance).

This dramatic change in the strategy of the players of this industry is contributing to a transition from a *trading industry* to a *global industry* where foreign direct investment is increasingly gaining importance while international trade still remains at a very high level.

According to Yip (2004) setting a global strategy requires making choices along a set of strategic determinants in order to maximize global performance. These determinants are as follows:

- Market Participation: In global industries the foreign countries selection is based on their potential contribution to globalization benefits. Under this situation a decision may include entering a country characterized by low attractiveness but having a global strategic significance such as the national market of a global competitor. This is the case of PortucelSoporcel which sells paper and pulp in Scandinavian countries. In a slightly different approach it may mean building market share in few number of markets rather than having a widespread worldwide market coverage.

- Product offering: In fact, Market Pulp is basically a standardized product, that is a commodity which does not require any local adaptation. Thus, cost reduction is often the most important feature of product standardization.

- Location of Value Added Activities: over the years Market Pulp evolved from exporting, where most of the value chain activities were kept in the home country, to a global industry where different value added chain activities may be located in different countries. For example the direct investments conducted in production facilities by European companies in developing countries in order to have access to raw materials.

- Marketing Approach: The marketing approach tends to be more uniform around the globe but still some differences on the marketing mix apply to some of the specific markets. Again it can be said that the fact of pulp is a commodity-like product makes the uniform marketing approach less complicated and with less impact in the different markets.

- Competitive Moves: all the major competitors in Market Pulp are, broadly speaking, characterized by having global strategies that are their integrated competitive moves across countries. The increasing of foreign direct investment in this industry is, to some extent, in order to gain access to some markets in a targeted geographical area.

It can be argued that the shift towards a global industry by the implementation of a global strategy by the companies in the Pulp industry will lead to an even higher industry concentration but also to a higher competition among the major companies. They will benefit from the cost reductions resulting from the economies of scale; they will have a higher bargaining power towards suppliers (mainly energy providers and machinery manufacturers) and increased quality of products resulting from a higher standardization and new machinery investments.

On the other hand a global strategy also brings some important challenges such as the effects that product standardization might have on consumer response and the lack of flexibility from a more spread organizational structure. Therefore the right balance needs to be made to optimize medium and long term profits and competitive power.

## **5.7 Firms in the Pulp and Market Pulp Industries**

Firms in the Pulp and Market Pulp Industries are mainly Multinational Enterprises (MNEs). MNEs usually comprise companies that are established in several countries linked in a way that the processes, procedures and operations are coordinated in various ways. “While one or more of these entities may be able to exercise a significant influence over the activities of others, their degree of autonomy within the enterprise may vary widely from one multinational enterprise to another. Ownership may be private, state or mixed” (OECD, 2008). Broadly speaking the activities of MNEs are based on Foreign Direct Investment (FDI) locating part of their activities such as R&D, production, sales and distribution in other countries. These investments are actively managed as a single operational entity in unified corporations.

Currently, the internalisation theory (Buckley and Casson, 1976) posits that the MNE internationalises through internalisation that is the MNE will establish a specific business transaction through its internal hierarchical organisational structure rather than relying on external partners by setting up wholly owned subsidiaries.

Internalisation theory emerges from the market imperfection approach (Hymer, 1976) posits that some firm specific advantages such as superior product technology, management skills and so forth of a MNE could offset costs and information advantages detained by national companies in their home markets. In fact, while the latter have an intimate knowledge of the market conditions in their domestic countries the former can only obtain that knowledge at a cost. The competitive advantage of the MNE is explained by imperfections in markets for goods or factors of production. These imperfections are the consequence of certain firms acquiring competitive advantage through product differentiation, technological advantages and the access to financial resources.

In sum, firms internationalise in order to reduce costs by internalising the transfer of goods and services across national boundaries. Choosing for each stage of production the lowest cost location and optimal organization structure in so that transaction costs are minimized. In addition, it also considers that a MNE develops some specific

monopolistic advantage in the home market and can keep this advantage in foreign markets at little additional costs (Caves, 1982). However, if this specific advantage cannot be kept throughout the process of internationalization against any opportunistic behaviour of other firms, market imperfections or other situations, it is likely that firms prefer to internalise these activities within their hierarchical organizational structures. Indeed, by internalising activities firms are more able to keep control of valuable and unique resources that may possess. In other words, for firm's expansion these unique resources and capabilities are better protected and deployed by the use of sales/wholly owned subsidiaries rather than relying on the use of external markets.

Another economic approach to internationalization is Dunning's Eclectic Paradigm (Dunning, 1980) which in contrast with transaction cost economics (TCE) suggests that the minimisation of transaction costs is not the only factor influencing internationalisation. Indeed, in his framework, Dunning suggests that the combination of ownership, location and internalisation are the main factors explaining internationalisation decisions. Ownership advantages represent firm unique assets and resources that allow the firm to obtain competitive advantage. Example of ownership advantages could lay on the access to unique resources (static ownership advantages) and/or the capacity to organise mobilise and deploy resources in a more efficient way (dynamic ownership advantages). Location advantages intent to represent the attractiveness of a certain market in terms of market size, potential growth and potential risk. Overall Dunning's framework is mainly concerned with international production/operation choices of MNEs as well as on the intra firm trade for intermediate products.

In short, the key issues of Internalisation Theory and Dunning's Eclectic Paradigm are on why and in what forms MNEs exist and the types of foreign market expansion they currently use rather than trying to explain the evolution process in becoming MNEs. This approach may be appropriate to understand the foreign expansion for MNEs in the forest industry (Ohmae, 1982)

## 6. World Wide Market Pulp Forecasts

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*In this chapter the worldwide Market Pulp demand is analysed as well as the factors from which the demand is mostly derived – the GDP per capita and its development.*

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Taking into account both the total pulp production and consumption figures (see Table 9) and the foreseen GDP growth, a forecast can be made to find out where the future opportunities for the Portuguese market pulp producers are more likely to arise. These forecasts and assumptions are based on exogenous variables such as the GDP and population growth in each qualified country, productive investments conducted by competitors, geographical location and also some endogenous factors such as location of production sites, current target markets and distribution channels, perceived quality of products and company strategy/objectives.

We will start by listing the countries with the biggest deficits in pulp own supply – meaning the ones in which demand is significantly higher than their own production:

1. **China** – 7.898.000 tonnes deficit
2. **Germany** – 3.726.000 tonnes deficit
3. **Italy** – 3.516.000 tonnes deficit
4. **South Korea** – 2.541.000 tonnes deficit
5. **Japan** – 2.135.000 tonnes deficit
6. **France** – 1.430.000 tonnes deficit
7. **UK** – 1.341.000 tonnes deficit
8. **Taiwan** – 861.000 tonnes deficit
9. **Benelux** – 886.000 tonnes deficit
10. **India** – 428.000 tonnes deficit

There are different explanations for these several countries to be included on this top 10 deficit pulp areas.

Countries such as Germany, Italy, France, UK, Japan, South Korea, Taiwan and Benelux have invested substantially in paper production facilities resulting in a higher demand for raw materials/semi-finished products/inputs for the paper mills (*PulpWatch, 2007*).

They have focused on the end consumers and their entire industrial infrastructure is concentrated on the final stage of the production chain that is the final product.

On the other hand China and India have seen a tremendous growth in the demand for paper and pulp and still don't have the productive infra-structure to address the current and future demand over the next few years.

As emphasized in section 5.5 several empirical studies give evidence to the positive correlation between GDP growth and consumption of pulp and paper products. Thus, this study takes the GDP forecasts set out by the International Monetary Fund over the period 2009-2012 in order to create different geographical clusters dependent upon the expected GDP growth rate in that specific geographical area/region. In this context, this study makes the distinction between slow, medium and high growth geographical areas. More specifically defines a slow growth region/geographical area as a region where the GDP is expected to grow at a compounded annual growth rate over the period of less than 2%. The same applies for medium growth regions where the GDP compounded annual growth rate is expected to be in a range of 2% - 5 %. Annual compounded growth rates of GDP above 5% this study considers as high growth region.

Nevertheless some caution is required with these worldwide GDP forecasts, taking into consideration the current situation of recession in much of the industrialized world sparked by a financial crisis, which was caused in part by the combination of a real estate bubble in the United States and securitization of real estate mortgages. This very precarious financial situation was made more difficult by a sharp increase in oil and food prices. In addition the financial crisis has produced a "manufacturing crisis" with the strongest declines in industrial production occurring in export-based economies. (The Economist, February, 2009). Moreover, sharp declines in industrial output were reported in the current year in almost all of the developed and developing economies.



Although the overall prospects for the world economy look gloomy, both in short and medium term, the assumption of this study is that the relative situation among the different countries/regions remains basically the same but of course with a much lower reference level for GDP growth.

Therefore, this study purposes the geographical clusters presented in Table 18

**Table 18**  
**Forecasted GDP growth per region**

<b>Forecasted GDP growth expected</b>	<b>Regions</b>
Slow Growth	Western Europe, North America
Medium Growth	Eastern Europe, Maghreb
High Growth	China, India

*Source: IMF, website August 2008*

## 7. Research Methodology

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*In this chapter the research methodologies used on this dissertation are described.*

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The term methodology refers to the approach in which problems are addressed and the answers are found (Taylor and Bogdan, 1998) and it also applies to the way research is conducted.

Overall this research study is quantitative on its essence but has also a strong qualitative element and can also be considered investigational as it allows creating an insight into the Paper and Pulp markets and their mechanisms.

In this thesis the researcher started by conducting a review of relevant literature for the topic in analysis. Then a series of semi structured interviews were held with key senior employees of PortucelSoporcel, Altri Group and Spanish Ence. These semi structured interviews had the aim to focus on the key subject of this thesis but, at the same time allowing to vary the order in which questions are made and to introduce new questions in the context of the research situation (Saunders *et al.*, 2008).

An important number of secondary data sources were also utilized. Existing Master theses that have statistically shown the correlation between the GDP and the consumption of paper have been analyzed and used as evidence. These theses compiled data using primary data sources as well as secondary data sources matching the evolution of the GDP to the consumption of paper demonstrating the correlation between each other.

This paper also analyzed multi Source secondary data reports from specialized consultancy companies – RISI and Hawkins Wright.

## **8. Conclusions, Recommendations and Suggestions for Further Research**

*In this chapter the conclusions, recommendations and suggestions for further studies are stated. Geographical opportunity areas and their relative importance are put forward and differentiated between the main Portuguese producers.*

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### **8.1 Main Conclusions and Recommendations**

Taking the above into account, it can be argued that the 3 main target markets for Portuguese market pulp producers are:

- 1. Western Europe**
- 2. China / India**
- 3. Eastern Europe / Maghreb**

#### **8.1.1 Western Europe**

Considering that Portugal produces a high quality pulp highly appreciated on these quality demanding markets and adding the fact of the geographical proximity compared with main competitors in South America and USA - allowing for much lower transport costs - Western European countries will have to be kept as strategic and the most important market for market pulp producers such as Altri Group and PortucelSoporcel.

Despite the slow growth forecast and competition from Scandinavian and Russian companies these countries are not likely to lose their place as the main target markets for Portugal not only due to the facts just mentioned, but also because the per capita consumption, and therefore the total volumes consumed, is extremely high and the distribution channels are already well established.

#### **8.1.2 China / India**

These are the single main growth markets – paper demand derived from GDP growth - and the potential is huge given the population involved. The lack of production facilities

and the low productivity of the existing ones, mean that the local ability to supply markets is small and uncaps a short term opportunity for market pulp producers.

It is also important to notice that the incremental capacity production being made presently in South America and Asia (mainly Indonesia) is exactly to supply the Chinese market in order to take advantage on these business opportunities.

Competition will therefore be difficult but the low transportation costs from Europe to China (back haul of main trade routes Asia – Europe with transport costs by sea of \$ usd 65/tonne compared with \$ usd 100/tonne on average from South America to China, *Maersk Line 2009*), the size of the markets and the demand growth expected for the next years turn these countries into strategic target markets also to place short term excess capacity based on single orders and not as a continuous running business.

### **8.1.3 Eastern Europe / Maghreb**

Eastern Europe / Maghreb are the fastest growing markets closer to Portugal and where production facilities are still almost non existent. These markets can be strategically important to place short term excess capacity. There are two main reasons for this:

1. Above world average GDP growth rates in countries such as Poland, Czech Republic, Romania, Bulgaria, Turkey, Tunisia, Algeria and Morocco. This means consumption of pulp and paper products will increase higher than world's average
2. Low transportation costs and short distribution channels

It is important to take notice that competition from Scandinavian and Russian companies is extremely strong mainly north of the Balkans due to the fact that those companies are already established in those markets for a long period as well as the relatively low transportation costs that they have compared with competition from other parts of the world.

When comparing these three main business opportunities areas with the strategic areas mentioned in the business plans and interviews held in the companies we see that there are overlapping areas. Western and Eastern Europe are seen as strategic and where the resources will be deployed. That is also stated on this study. Nevertheless this dissertation indicates also other opportunities that should not be overlooked by the Portuguese companies. India and China as well as the Maghreb countries have an important potential and could have a significant impact on the sales of the companies. This includes not only a strategic plan to target those markets, and hence gain market share, but also as destinations where tactic moves can be made, specially when demand from more mature markets decrease and overcapacity can be a challenge. China, India and Maghreb are expected to have the necessary demand to absorb the spot extra capacity at any moment.

Finally this study seeks to differentiate between the next strategic steps to be taken by Alti Group and PortucelSoporcel.

While Alti companies are almost purely market pulp producers – hence it can closely follow the suggestion just described – PortucelSoporcel is a vertically integrated company with undergoing investments on the paper segment.

Therefore one can state that the recommendations, suggestions and business forecasts put forward on this study mainly apply to Alti.

For PortucelSoporcel it is only natural the Market Pulp made available in the world markets will decrease. This will enable PortucelSoporcel to increase the synergies and take full advantages of the current production portfolio and therefore to forward integrate in the more valuable paper business segment. Table 19 summarizes the main recommendations and the reasons behind it:

Table 19

<i>Geographic Target Market</i>	<i>Current Volume attractiveness</i>	<i>Foreseen Volume attractiveness</i>	<i>Other Strategic reasons</i>	<i>Main Risks</i>
Western Europe	High	Low	<ul style="list-style-type: none"> <li>• Low Transportation Cost</li> <li>• Distribution channels already established</li> <li>• Strong product fitting the demand</li> </ul>	<ul style="list-style-type: none"> <li>• High competition</li> <li>• Mature markets</li> <li>• Complex distribution channels</li> </ul>
China / India	Medium	High	<ul style="list-style-type: none"> <li>• Low transport costs</li> <li>• Lack of local supply</li> <li>• Ability to take advantage of a possible short term excess capacity</li> </ul>	<ul style="list-style-type: none"> <li>• High competition</li> <li>• Lack of trade history</li> <li>• Lack of knowledge of local markets</li> </ul>
Eastern Europe / Maghreb	Low	High	<ul style="list-style-type: none"> <li>• Low Transport Cost</li> <li>• Not demanding markets</li> </ul>	<ul style="list-style-type: none"> <li>• Economies more prone to economic turmoil</li> <li>• In the case of Eastern Europe high competition from Scandinavian companies</li> </ul>

*Source: The Author*

## **8.2 Further Studies**

In order to further understand these markets we suggest further analysis concerning some important issues that were not included in the scope of this study. The full impact of the infrastructures being built specially in South America will impact medium term the world supply of pulp. If world demand for pulp does not increase in the same proportion producers will face overcapacity that will impact all the mechanics of the market.

Another factor to investigate is how the expected demand in the world markets, and on their regions, as well as the need to search and increase access to raw materials could affect and make worthwhile to invest in production facilities near the final customers or with easy and low cost access to raw material.

Finally it would be important to study the impact of the present crisis in the world paper and pulp demand as well as on the financial health of the companies and on going projects.

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## Appendix 1

**World Paper and Board Production by Grade 2005-2006 (1,000 tonnes)**

		<b>Asia</b>	<b>Europe</b>	<b>North America</b>	<b>Latin America</b>	<b>Africa</b>	<b>Australasia</b>	<b>Total</b>
<b>Newsprint</b>	<b>2005</b>	10,615	12,981	12,662	917	427	798	<b>38,401</b>
	<b>2006</b>	11,445	13,571	11,863	944	427	711	<b>38,960</b>
<b>Printing/writing</b>	<b>2005</b>	38,487	39,613	28,936	4,111	848	614	<b>112,609</b>
	<b>2006</b>	41,871	40,493	28,784	4,246	979	591	<b>116,964</b>
<b>Tissue</b>	<b>2005</b>	8,007	6,754	7,446	2,500	383	270	<b>25,360</b>
	<b>2006</b>	8,564	6,830	7,549	2,640	399	271	<b>26,252</b>
<b>Containerboard</b>	<b>2005</b>	44,834	27,375	33,999	6,900	1,750	1,874	<b>116,732</b>
	<b>2006</b>	49,339	28,517	34,893	7,086	1,760	1,963	<b>123,557</b>
<b>Board</b>	<b>2005</b>	16,341	13,869	14,820	1,803	283	321	<b>47,437</b>
	<b>2006</b>	17,956	14,366	14,879	1,840	283	327	<b>49,651</b>
<b>Total P&amp;B*</b>	<b>2005</b>	129,210	109,730	102,168	17,849	4,039	3,959	<b>366,954</b>
	<b>2006</b>	140,794	113,243	102,243	18,325	4,156	3,944	<b>382,706</b>

\*Total P&B includes "Other paper category"

Source: RISI Inc. "Pulp and paper production annual report 2006"

## Appendix 2

### Paper and Board production per country

<b>P&amp;B production (1000 tonnes)</b>	<b>2006</b>	<b>% change</b>
		<b>06/05</b>
1. USA	84.073	1,7
2. China, People's Rep.	65.000	16,1
3. Japan	31.106	0,5
4. Germany	22.655	4,5
5. Canada	18.170	-6,8
6. Finland	14.151	14,2
7. Sweden	12.066	2,5
8. South Korea	10.703	1,5
9. Italy	10.009	0,1
10. France	10.006	-3,1
11. Indonesia	8.862	8,0
12. Brazil	8.723	1,5
13. Russia	7.396	5,3
14. India	7.006	6,2
15. Spain	6.353	11,5
16. United Kingdom	5.589	-7,5
17. Austria	5.213	5,3
18. Taiwan	4.646	-0,3
19. Thailand	4.646	22,4
20. Mexico	4.491	1,4
21. Netherlands	3.367	-3,0
22. Australia	3.064	1,9
23. Poland	2.855	1,9
24. South Africa	2.607	3,8
25. Turkey	2.118	8,5
26. Norway	2.109	-5,1
27. Belgium	2.009	8,3
28. Argentina	1.720	8,1
29. Switzerland	1.685	-3,8
30. Portugal	1.630	1,7
Total 30	364.028	
Total 30 / Total	95%	

Source: RISI Inc. "Pulp and paper production annual report 2006"

**Paper and Board consumption per country**

<b>P&amp;B consumption</b>	<b>2006</b>	<b>% change</b>
		<b>06/05</b>
1. USA	90.517	1,1
2. China, People's Rep.	66.000	11,3
3. Japan	31.527	0,2
4. Germany	20.858	5,8
5. United Kingdom	12.344	-1,4
6. Italy	11.693	-0,3
7. France	10.911	-0,4
8. South Korea	8.620	2,9
9. Spain	7.868	6,5
10. Brazil	7.701	5,1
11. India	7.623	6,6
12. Canada	7.127	-2,2
13. Mexico	6.694	5,6
14. Russia	5.997	10,5
15. Indonesia	5.612	1,8
16. Taiwan	4.761	-3,9
17. Thailand	4.167	20,8
18. Turkey	4.112	9,8
19. Poland	3.791	10,9
20. Belgium	3.755	6,7
21. Australia	3.697	1,1
22. Netherlands	3.538	3,1
23. Malaysia	2.706	3,4
24. Sweden	2.417	3,3
25. South Africa	2.381	10,1
26. Argentina	2.323	6,7
27. Austria	2.116	4,9
28. Iran	1.806	11,0
29. Finland	1.728	1,8
30. Switzerland	1.656	-0,9

Total 30 346.046

Total 30 / Total 90%

Source: RISI Inc. "Pulp and paper production annual report 2006"

### Pulp production per country

Pulp production	2006	% change
		06/05
1. USA	53.215	0,5
2. Canada	23.677	-7,2
3. China, People's Rep.	18.160	11,3
4. Finland	13.066	17,4
5. Sweden	12.240	1,1
6. Brazil	11.282	7,8
7. Japan	10.884	0,4
8. Russia	7.270	1,4
9. Indonesia	5.672	3,7
10. Chile	3.550	6,5
11. India	3.250	-3,0
12. Germany	2.938	2,0
13. France	2.466	-3,8
14. South Africa	2.321	1,3
15. Norway	2.304	-6,3
16. Portugal	2.065	3,8
17. Spain	2.037	3,3
18. Austria	1.930	-0,2
19. New Zealand	1.501	-6,2
20. Thailand	1.129	6,4
21. Australia	1.119	0,0
22. Poland	1.062	-2,2
23. Argentina	967	6,4
24. Czech Republic	766	1,1
25. Italy	683	-2,0
26. Slovak Republic	627	2,8
27. Belgium	507	-0,4
28. South Korea	506	-1,0
29. Iran	420	6,3
30. Taiwan	392	6,2
Total 30	188.006	
Total 30 / Total	98%	

Source: RISI Inc. "Pulp and paper production annual report 2006"

### Paper and Board consumption per country

<b>Pulp consumption</b>	<b>2006</b>	<b>% change</b>
		<b>06/05</b>
1. USA	53.851	1,0%
2. China, People's Rep	26.058	9,2%
3. Canada	13.237	-10,7%
4. Japan	13.019	0,1%
5. Finland	10.639	13,9%
6. Sweden	9.212	1,3%
7. Germany	6.664	-0,4%
8. Russia	5.699	2,9%
9. Brazil	5.387	2,4%
10. Italy	4.199	-1,5%
11. France	3.896	-4,9%
12. Indonesia	3.794	0,1%
13. India	3.678	-3,0%
14. South Korea	3.027	0,4%
15. Austria	2.416	4,0%
16. Spain	1.991	3,4%
17. Portugal	1.758	5,5%
18. Norway	1.686	-9,8%
19. South Africa	1.678	2,7%
20. United Kingdom	1.628	-1,8%
21. Australia	1.461	0,1%
22. Poland	1.446	-4,0%
23. Thailand	1.416	6,9%
24. Taiwan	1.253	4,2%
25. Mexico	1.115	4,7%
26. Chile	987	37,5%
27. Netherlands	835	-23,3%
28. Belgium	685	3,2%
29. New Zealand	642	-13,7%
30. Switzerland	623	-2,7%
Total 30	183.980	
Total 30 / Total	96%	

Source: RISI Inc. "Pulp and paper production annual report 2006"