

**ON THE TRANSFORMATION PROCESSES OF THE GLOBAL
PULP AND PAPER INDUSTRY AND THEIR IMPLICATIONS
FOR CORPORATE STRATEGIES – A European perspective**

Doctoral Dissertation

Timo Uronen



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ABSTRACT

Pulp and paper industry has suffered from persistent low profitability in North America and Europe for many consecutive years now. Companies have been forced to close down excess capacity, reduce costs and divest non-core assets, and the whole industry is considered to be in crisis and in need of transformation in the developed countries. The main objective of this study is the analysis of the key structural and fundamental changes underway in the global paper industry and to find out their drivers and implications to companies' business strategies from the European perspective.

More specifically, the study aims to provide answers to the following research questions: why is industry transformation necessary, what are the key drivers of the transformation process, what role do cost efficiency, value chain positioning, consolidation, R & D and emerging markets play in the transformation and what are the implications for the corporate strategies of individual companies. Research methodology consisted of both positivistic and phenomenological methods: use of quantitative analysis of financial results and value chains and in-depth interviews of industry's senior managers regarding industry future and turnaround management. Key theoretical concepts and previous research and literature were first reviewed.

The main findings of the study are, that industry transformation and strategy renewal are needed in order for the industry to return to healthy profitability. The main drivers of the transformation process were found to be high capital intensiveness, maturing or even declining phase of the product life-cycle, cost and availability of fiber and different global phases of the industry, substitution by electronic media, low value creation in the total value chain to consumers and low global level of consolidation – leading to supply and demand imbalances and low profitability.

According to the study, the different strategic responses of the industry to adapt consist of improving cost efficiency and turnaround management, increased consolidation, investments in emerging markets, efforts to increase value-creation and enhanced R & D.

Cost reductions and closures of overcapacity will need to be continued, but on their own they will not be enough – most turnaround cases studied in this research failed to deliver sustained profitability improvement. Companies need to develop entirely new products or reengineer their business models to radically reduce costs in order to avoid further commoditization of their products and services.

Although the industry is globally fragmented, within specific products and regions such as LWC in Europe it is highly consolidated. This, however, has not been enough on its own to improve profitability and the evidence regarding the impact of consolidation on for instance pricing remains inconclusive.

Most paper and board producers are positioned in the middle of the value chain, and they generate only ca 5 % of the total value creation in the paper value chain – companies need to consider the viability of their current value chain positioning. Emerging markets such as China, Brazil and Russia are growing rapidly and they offer both opportunities and challenges to the Western pulp and paper industry.

Western companies have been relatively slow in expanding in these markets, and they should reconsider their current strategies for the emerging markets. R& D efforts have been intensified to find new products and entire new businesses such as biofuels, but the bulk of the industry's revenues will continue to be generated from the traditional pulp, paper and board products for many years to come.

None of the above-mentioned strategic responses is likely to be enough on its own to sufficiently improve profitability and they will take a long time to have a full impact. Companies need to develop all or most of them simultaneously. This places an additional management challenge to industry leaders, and it is likely that not even the biggest companies have the financial and managerial resources to develop all of the above at the same pace. This means, that companies have to focus their efforts and make difficult choices – for instance, whether to defend local market position through cost efficiency, strive for added value in the value chain, develop completely new products or invest in emerging markets. It must be noted, that all of the above actions take a long time to have a full impact and until then the industry must ensure the competitiveness of its existing products and services against substitution such as electronic media.

Pulp and paper industry will remain a major industry in North America and Europe, and globally the demand for its products is forecasted to grow. A number of companies also in Europe and North America have been profitable even during the current recession, indicating that industry transformation and renewal is possible.

Key words: strategy, pulp, paper, packaging, profitability, transformation, value chain, consolidation, cost efficiency, turnaround management, R & D, emerging markets

VÄITÖSKIRJAN TIIVISTELMÄ

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TIIVISTELMÄ

Metsäteollisuus on jo usean vuoden ajan kärsinyt heikosta kannattavuudesta Pohjois-Amerikassa ja Euroopassa. Yritykset ovat joutuneet sulkemaan ylikapasiteettia, karsimaan kustannuksia ja divestoiimaan ydinliiketoimintaan kuulumattomia yksiköitä, ja yleisesti ottaen koko alan katsotaan olevan kriisissä ja uusiutumisen tarpeessa. Tämän tutkimuksen pääasiallinen tavoite on metsäteollisuuden rakenteellisten muutosten ja niiden taustatekijöiden analysointi sekä niiden vaikutusten arviointi yritysten strategiaan.

Tutkimus pyrkii vastaamaan seuraaviin tutkimuskysymyksiin: miksi metsäteollisuuden muutosprosessi on välttämätöntä, mitkä tekijät vaikuttavat heikon kannattavuuden taustalla, mitkä tekijät ovat muutosprosessin ajureita, mikä on kustannustehokkuuden, nousevien markkinoiden, tutkimus- ja tuotekehityksen, konsolidoitumisen ja arvoketjuposition rooli muutosprosessissa ja mitä vaikutuksia muutosprosessilla on yritysten strategiaan. Tutkimusmenetelminä sovellettiin sekä positivistisia että fenomenologisia menetelmiä: kvantitatiivista analyysia liittyen arvoketjuihin, kustannustehokkuuteen ja kannattavuuteen sekä haastattelututkimuksia liittyen turnaround-prosesseihin ja alan haasteisiin ja tulevaisuuteen. Keskeiset teoreettiset kulmakivet ja relevantit aikaisemmat tutkimukset ja kirjallisuus muodostivat tutkimuksen perustan.

Tutkimuksen tulosten perusteella voidaan todeta, että metsäteollisuuden muutos- ja uusiutumisprosessi on välttämätöntä kannattavuuden paranemiseksi. Muutosprosessin ajureina toimivat korkea pääomatarve, kypsä elinkaaren vaihe, kasvun maantieteellinen jakaantuminen, kuidun saatavuus ja hinta, korvaavat tuotteet, alhainen arvonmuodostus koko arvoketjussa sekä globaalilla tasolla alhainen konsolidaatioaste, jotka johtavat kysynnän ja tarjonnan epätasapainoon ja heikkoon kannattavuuteen.

Teollisuuden strategiset toimenpiteet muutosprosessiin sopeutumiseksi ja kannattavuuden parantamiseksi koostuvat kustannustehokkuuden parantamisesta, konsolidoitumisasteen nostamisesta, investoinneista nouseville markkinoille, pyrkimyksestä lisäarvon nousuun sekä T & K panostuksesta.

Kustannusten ja ylikapasiteetin leikkaaminen on jatkossakin tarpeen, mutta yksinään ne eivät tule riittämään: useimmat kustannusleikkuprojektit ja tutkitut turnaround – prosessit eivät johda pysyvään kannattavuuden paranemiseen. Yritysten on joko luotava kokonaan uusia tuotteita tai uudistettava radikaalisti liiketoimintamallejaan leikatakseen kustannuksia, jotta tuotteiden ja palveluiden lisäbulkkiintuminen voidaan pysäyttää.

Vaikka metsäteollisuus on globaalisti fragmentoitunut, tietyissä tuotteissa ja maantieteellisillä alueilla kuten Euroopan päällystetyissä aikakauslehtipapereissa ala on pitkälle konsolidoitunut. Tämä ei kuitenkaan ole johtanut parempaan kannattavuuteen ja konsolidoitumisen vaikutusta esimerkiksi hintoihin ei ole kyetty yksiselitteisesti osoittamaan.

Paperin ja kartongin valmistajat ovat positioituneet pääsääntöisesti arvoketjun keskiosaan, ja ne tuottavat tutkimuksen mukaan ainoastaan n. 5 % koko ketjun arvonmuodostuksesta. Pääosa arvonmuodostuksesta tapahtuu ketjun loppuosassa, ja yritysten on arvioitava nykyisen arvoketjupositionsa optimaalisuutta. Pieni osuus arvonmuodostuksesta voidaan nähdä myös mahdollisuutena.

Nousevat markkinat kuten Kiina, Intia, Brasilia ja Venäjä kasvavat nopeasti ja ne ovat Pohjois-Amerikan ja Euroopan metsäteollisuudelle sekä mahdollisuus että uhka.

Länsimaiset yritykset ovat edenneet näillä markkinoilla varsin hitaasti, ja niiden tulisi arvioida laajenemisstrategiansa uudelleen. Samalla näiden markkinoiden yritykset ovat nousemassa vakaviksi kilpailijoiksi länsimaisille yrityksille.

Metsäteollisuus on tehostanut tutkimus- ja kehitystoimintaansa löytääkseen uusia tuotteita ja liiketoiminta-alueita kuten biopolttoaineet ja nanokuidut, mutta pääosa alan liikevaihdosta tulee vielä useiden vuosien ajan perinteisistä tuotteista.

Yksikään edellämainituista strategisista toimenpiteistä ei todennäköisesti yksinään tule riittämään alan kannattavuuden olennaiseen paranemiseen, minkä lisäksi näiden toteuttaminen vie useita vuosia. Yritysten on kehitettävä e.m. osa-alueita samanaikaisesti, ja tämä asettaa uusia haasteita yritysten taloudellisille ja johdon resursseille. Kaikkein suurimmillakaan yrityksillä ei välttämättä ole resursseja kehittää kaikkia e.m. tekijöitä samaan tahtiin, joten yritysten on tehtävä vaikeita valintoja ja priorisoitava kehityskohteensa. Lisäksi on todettava, että muutosprosessi vie useita vuosia ja samanaikaisesti yritysten on kehitettävä nykyisten tuotteiden ja palveluiden kilpailukykyä vastatakseen korvaavien tuotteiden kuten elektronisen median haasteeseen.

Metsäteollisuus tulee säilymään merkittävänä teollisuuden alana myös Pohjois-Amerikassa ja Euroopassa, ja sen tuotteiden kysynnän ennustetaan globaalilla tasolla kasvavan. Koska eräät metsäteollisuusyritykset ovat säilyttäneet kohtuullisen kannattavuuden myös viime vuosien haasteellisessa toimintaympäristössä, voidaan todeta että alan muutosprosessi ja uusiutuminen on mahdollista.

Avainsanat: metsäteollisuus, strategia, kannattavuus, muutosprosessi, arvoketju, konsolidaatio, kustannustehokkuus, turnaround-prosessi, T & K, nousevat markkinat

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A research project such as writing a dissertation for the degree of doctor of science and technology usually takes many years, and this project is no exception. I started to work on this project already in 2003, but working abroad in Indonesia and China for Asia Pulp & Paper and subsequently for Ernst & Young in Finland proved very challenging to combine with this research. Also the topic changed considerably during this time – my original interest was to focus on innovation capabilities of the paper industry.

However, through the help, support and patience of many people I finally managed to muster the time and energy necessary to collect my thoughts, ideas, articles and research of the past few years. The first draft of this dissertation was written during summer of 2009 over an intensive three week period of working in our family's summer cottage during my summer holiday. Peace, quiet and lack of distractions such as e-mails or urgent mobile phone calls was what was needed.

I am greatly indebted to my supervisor, professor Hannu Paulapuro from Aalto University, School of Science and Technology, for his guidance, advice and support over many years. Without him this dissertation would most likely never have been completed.

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Helsinki, September 23rd, 2010.

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ABBREVIATIONS OF PAPER INDUSTRY TERMINOLOGY USED IN THE RESEARCH (Diesen 2007, Paulapuro 2000)

AFPA	American Forest Products Association
BCTMP	Bleached chemithermomechanical pulp
BHKP	Bleached hardwood kraft pulp – chemical short fiber pulp
Cartonboard	Multilayer boards made either from virgin fiber or recycled fiber, used for carton packaging of for instance cigarettes, frozen food, pharmaceuticals etc
CEPI	Confederation of European Paper Industries
Containerboard	Case materials (fluting and liner) used primarily for transport packaging of durable and non-durable consumer products
Corrugated board	Multilayer transport packaging based on containerboard
CTMP	Chemithermomechanical pulp
DIP	Deinked pulp – pulp produced from recycled fiber from which ink has been removed
FBB	Folding boxboard – cartonboard made from virgin fiber
Kraftliner	A linerboard belonging to containerboards, made from virgin fiber
LPB	Liquid packaging board
LWC	Light weight coated paper – woodcontaining coated paper used primarily for magazines
NBSK	Northern bleached softwood kraft pulp – chemical long fiber pulp
Newsprint	A group of uncoated papers used for newspapers – either woodcontaining or based on recycled fiber.
MWC	Medium weight coated paper – used for magazines and high-quality printing.
OCC	Old corrugated containers – recycled corrugated board used primarily as a fiber source for containerboard production
ONP	Old newsprint – recycled newsprint used primarily as a fiber source for newsprint production
RCF	Recycled fiber
SBS	Solid bleached sulphate – a cartonboard produced using only chemical pulp.
SC	Supercalendered, uncoated paper used mainly in magazines

Testliner	A containerboard made from recycled fiber, used as the outer liner in the corrugated boxes
TCF	Total chlorine free pulp
TMP	Thermomechanical pulp
WLC	White lined chipboard – a cartonboard produced using recycled fiber
WFC	Woodfree coated – a coated fine paper used primarily in high-quality graphical end-uses
WFU	Woodfree uncoated – an uncoated fine paper used primarily in office products such as copier papers, forms and envelopes

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1 INTRODUCTION

1.1 Background

Forest industry is in many ways a fascinating sector. Pulp, paper and mechanical forest products and suppliers to the industry combined generate ca 500 billion USD in turnover and millions of jobs. This is much bigger than many other better-known industries. Pulp, paper and packaging represent ca 70 % of the total sector turnover.

The role that paper and packaging has played historically – and continues to play today – has been vital to the overall development of society. Communication, preservation of culture and knowledge and better preservation and transport of food are just some of the important contributions of the industry to modern civilization.

Today, the end-products of the industry are used by billions of people in their everyday lives: newspapers, milk cartons, toilet paper, copier papers, bus tickets, magazines, books, fast-food packaging and numerous other both consumer and industrial end-uses.

The raw materials used by the industry are renewable, the products are safe to use, recyclable and the industry uses advanced technology to ensure its products are environmentally sound and produced efficiently. Yet the industry in North America and Western Europe has been in deep trouble already many years.

The biggest pulp and paper companies have produced dismal profits for 8 consecutive years now – and the near –term future does not offer brighter prospects. Pulp and paper industry in North America and Western Europe has been forced to close production capacity and thousands of jobs have been lost as a consequence. On the other hand, companies in the emerging markets of Asia and South America are investing and performing better.

An indication of the severity of the crisis is the “Manifesto for competitiveness and employment” published in June 2009 by CEPI (Confederation of European Paper Industries, 2009), which states: “The negative impacts of the economic crisis are being felt across the European pulp and paper industry. Demand is in sharp decline, investment shrinking and unemployment rocketing. Year on year production of most paper grades is down by anything between 16 % and 25 %. The industry is struggling to hold employment steady at 260 000 and its 5 billion EUR a year investment budget is under great pressure.

The European pulp and paper industry is eager to discuss its current difficulties and its structural problems with the European Commission and win its support for solutions that will maintain the industry's global leadership".

What are the underlying reasons for this, what are the characteristics of the on-going transformation process, what does the future look like and what are the implications for the corporate strategies of individual companies are key issues that the senior managers of most pulp and paper companies are currently concerned with. This study aims to shed light into the above very fundamental questions.

It should also be noted, that the title of the research is "*On the transformation processes of the global pulp and paper industry and their implications for corporate strategies – A European perspective*". Accordingly, this study does not attempt to be a fully comprehensive, in-depth and definitive treatise on such a wide-ranging and complex topic. The researcher fully acknowledges that this is beyond the scope of this study and therefore the study focuses on the most important issues that are relevant to the topic.

1.2 Structure of the study

The study is based on the researcher's work and research at Ernst & Young during 2007 – 2009. During that time the researcher was responsible for researching and creating several thought leadership reports on above topics. The backbone of the study is based on four globally distributed and published reports:

- 1 At the Crossroads – Global pulp and paper report 2007
- 2 The Art of Turnaround Management - the challenges of change in the paper industry 2008
- 3 A Perfect Match? Private Equity and global pulp and paper industry 2008
- 4 Eastern Promises – Survey on pulp and paper and the emerging markets 2009.

Although many members of Ernst & Young's global paper industry network contributed to the above reports in the form of conducting interviews, the formulation of interview questions, defining the structure of the reports and issues to be covered, background research as well as the writing of the texts and figures were carried out by the researcher himself. As an additional certification of the researcher's own contribution to the work is the fact, that all the reports were signed in hand-writing by the researcher himself.

In addition to the above reports, in the context of the study an extensive literature search was carried out as well as overview of relevant strategic and theoretical concepts.

The structure of the study is outlined in the following:

- Chapter 1 outlines the research objectives and questions, methodology, key definitions, scope and limitations.
- Chapter 2 presents key theoretical concepts and previous research used in the study.
- Chapter 3 outlines key global trends in the industry.
- Chapters 4 and 5 focus on the financial performance of the pulp and paper value chain.
- Chapter 6 studies paper industry consolidation – a topic that has often been presented as one of the prerequisites for improved financial performance.
- Chapter 7 focuses on cost efficiency and restructuring programs.
- Chapter 8 outlines the role that emerging markets such as China and Brazil play.
- Chapter 9 presents the results of industry interviews regarding the future outlook.
- Chapter 10 discusses the strategic considerations for the industry of the previous sections
- Chapter 11 provides the main findings, discussion of the results and the research questions.
- Chapter 12 discusses the limitations of the study and recommendations for further research.

Appendices include references, survey questionnaires, profitability figures of the main companies within the industry cluster, data on cost factors and list of top 100 pulp and paper companies.

The structure of the study is presented in Figure 1.

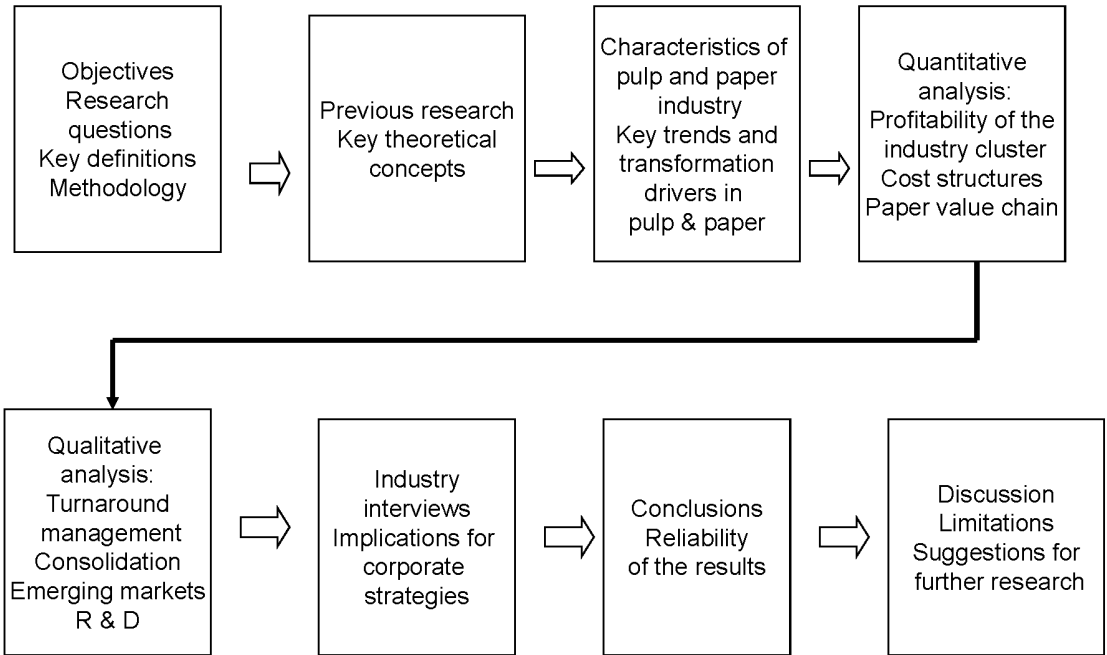


Figure 1: Structure and flow of the research

1.3 Definitions and scope

Some definitions are needed in order to further clarify the objectives of the study:

(1) *Transformation*, in the context of this work means fundamental and significant change, as opposed to incremental change. There are differing definitions in business literature regarding transformation – for instance in the field of operations management transformation process refers to “use of resources to change the state or condition of something to product output”. Mintzberg et al in their article on transforming organizations do not propose a definition for transformation, but their study focuses on implementing “major changes in organizations – turnaround, downsizing, revitalization etc” (Mintzberg, Ahlstram, Lampel, 1998). Finally – and perhaps surprisingly - Oxford Business Dictionary does not offer a formal definition of “transformation” but defines “transformational leadership” as a leadership style for implementing change (Oxford Dictionary of Business and Management, 2009).

Therefore, “transformation” - in the context of this research - is defined simply as a fundamental and strategic change in the business environment that has a major impact on companies’ long – term strategy and performance.

(2) *Strategy* is defined here as the pattern or plan that integrates an organization’s major goals , policies and action sequences into a cohesive whole (Quinn 1980). There are also other definitions of strategy, but for the purposes of this study the above is sufficient. *Strategic response* – in the context of this study - is an action or measure that a company implements in order to significantly change its competitive position.

(3) *Pulp and paper industry* refers to pulp, paper and packaging boards produced either from virgin or recycled fiber. Other forest products such as sawn goods, engineered wood or wood-based panels – though important parts of the forest industry - are beyond the scope of the study. Similarly, converting such as corrugated box or carton manufacturing are outside the scope.

It should also be noted, that although biofuels are currently considered as one promising new business area, this study focuses on the current and more traditional pulp and paper products which still for many years form the basis of the industry. Despite the attention that biofuels and other renewable energy sources have recently received, these are beyond the scope of this research.

Unless otherwise specified, the term “industry” as used in this study refers to the pulp and paper industry.

(4) *Pulp and paper industry cluster* refers to the entire system of companies participating in the paper value chain. It consists of machinery and chemicals suppliers, energy generation, automation and control systems, logistics, wood procurement, pulp and paper production and the customers such as printers, publishers and consumer products companies, as well as consultants of the industry.

(5) *Global* - as defined herein – refers to the main production and consumption regions of pulp and paper. They consist of North America, Europe, South America and Asia – these regions cover ca 90 % of world’s production and consumption.

(6) *End-user* is defined as the ultimate consumer of paper and board – for instance the reader of a magazine or the consumer who buys groceries packed in cartons made of packaging boards.

(7) *Value added* is defined as the increase in value of goods as a result of a step in the chain of manufacturing and distribution of the goods to the consumer.

Although paper and board is produced and consumed in regions such as Australia, Middle-East and sub-Saharan Africa, for the purposes of the study these regions are not included.

However, it must be noted that while the study has a global reach and it covers for instance emerging markets and companies that operate globally, the viewpoint and perspective is European pulp and paper industry – what do the issues covered here mean for the European paper industry. It seems, that people and thus also companies tend to analyze and see the world from their own country’s perspective – for instance, the Chinese may consider globalization issues very differently to that of Americans or Finns.

The scope of the study is therefore the following:

- (1) Pulp, paper and packaging boards.
- (2) North America, Europe, Asia and South America – from the viewpoint of the European pulp and paper industry.
- (3) Transformation – fundamental changes – underway in the industry.
- (4) Impacts on corporate level strategies of individual companies.

This still leaves a very wide ranging scope and many diverse issues to be studied. Some issues such as the environment, energy and the impact of electronic media would be topics for in-depth further studies, but for practical reasons these are covered only to the extent they are relevant to the research questions.

1.4 Objectives and research questions

The main objective of the study is *the analysis of the key structural and fundamental changes underway in the global pulp and paper industry and to find out their drivers and implications to companies' business strategy.*

In particular, the roles that cost efficiency, paper value chain positioning, consolidation, growth in emerging markets and research and development play in the transformation processes are studied more in detail. These can all be considered as strategic responses and measures that the industry has at its disposal to adapt to the transformation process. It should be noted, that several other factors also are significant – however, the above five are directly related to competitive strategy.

In more detail, the research questions of the study are the following:

- (1) What transformation processes are underway and why are they necessary?
- (2) What are the key drivers of the transformation process?
- (3) What role do cost efficiency, value chain positioning, consolidation, research and development and emerging markets play in the transformation and the future structure of the industry?
- (4) What are the underlying factors impacting industry's profitability?
- (5) What are the implications for the corporate strategies of individual companies?

The study aims to provide practical insights on the above issues in order to assist business leaders to better understand the critical issues and making the right strategic choices. The starting point of the study is therefore a more practical one rather than a theoretical one.

1.5 Research methodology

There are generally-speaking two different philosophies of scientific research that apply to social sciences and business – namely positivistic and phenomenological schools of thought. The characteristics of the two schools are different in many ways and the philosophy of science has been studied and debated for many years by such prominent philosophers as August Comte, Bertrand Russell, Edmund Husserl, Karl Popper and Michael Kuhn – with Comte considered the “father” of the positivistic line of thinking and the latter ones as later critics of this approach.

Positivistic view considers that natural phenomena can be observed by the researcher as a detached, objective analyst – carrying out experiments and drawing generalisable conclusions based on mostly quantifiable data. Often, generalization and modelling requires certain reductions or exclusions of some features of the study. The results should be statistically valid and independently repeatable in order to be considered as scientific and important.

Phenomenological line of thought considers the world as more complex and refutes the idea of an independent, detached observer. In this context the researcher is not an independent observer of a particular research problem but an intrinsic part of it – each research situation is considered unique. The results are not easily generalizable, but the method is considered very useful for more complex and non-quantifiable issues to be studied – especially in the fields of social and business sciences which often deal with the behaviour and motives of individual human beings.

It should be noted, that these two broad scientific philosophies are not mutually exclusive – although it would most likely be more elegant and pure to use only one underlying research philosophy, in many cases it is necessary to employ features of both lines of thinking. This research uses aspects of both lines of thinking, although mostly the research methodology can be characterized as more positivistic rather than phenomenological. The aim has been to quantify results as much as possible, although the limitations of this have also been recognized.

The more phenomenological aspects of the research are based on using in-depth interviews, which focused on turnaround management and industry future. The positivistic view – or quantitative analysis - concentrated on the profitability and value creation of the different value chain participants, as well as cost efficiency and emerging markets. Details on the research methodologies employed in different parts of the study are outlined in the following.

- (1) Extensive literature search and analysis of the relevant theoretical concepts and previous research – including those of the researcher at Ernst & Young.
- (2) Analysis of the profitability of the biggest pulp and paper companies of the world and the main participants of the paper value chain of selected pulp and paper firms. This is intended for answering research question 1: Why is industry transformation necessary?
- (3) Analysis of the paper value chain and value creation to the end consumer, based on actual cases in 2007. The aim is to contribute to answering research questions 3 and 4.

(4) Interviews of senior executives on the critical success factors of 12 turnaround cases in Europe. The objective is to contribute to answering research questions 2,4 and 5.

(5) Interviews of senior executives on the critical success factors and the future of the industry. The aim is to provide insights to questions 4 and 5.

Due to the complexity and wide – ranging issues covered by the research questions, no single unifying research methodology could be adapted. Therefore, a combination of literature analysis, profitability and cost analysis based on empirical data and interviews was found to be the most suitable approach. The aim of using both quantitative and qualitative analysis is also to improve the validity and reliability of the results.

Each of the above methods is discussed more in detail in the following:

(1) Literature search was carried out using the PIRA database of the Helsinki University of Technology, yielding a total of 374 articles in trade press throughout the world published between 1999 and 2009. The search words used were combinations of “Paper industry”, “Strategy” and “Transformation”.

Previous relevant research in the form of published papers, conference presentations and dissertations was collected using the library services of the Helsinki University of Technology and the Helsinki School of Economics. At the same time literature and articles on key strategic concepts such as value chain analysis, change management, business turnarounds and transformation was collected.

This section includes also the research carried out in Ernst & Young regarding emerging markets, private equity, M & A practices and cost efficiency programs.

(2) Quantitative analysis of the financial performance of the biggest pulp and paper companies and their key customers and suppliers was carried out. The data consists of net sales, earnings before interest and taxes (including non-recurring items), return on capital employed (where possible) between 2003 and 2008 of 54 companies. These consisted of 23 pulp and paper companies from North America, Europe, Japan, Australia, South Africa and Brazil, 9 chemicals and machinery suppliers and 22 publishers, printers, merchants and brand-owners. The results are presented in Appendix 4.

The time period 2003 – 2008 or 6 years may not seem to be long enough for a capital intensive and cyclical industry such as pulp and paper. However, the period ranges over a “normal” business cycle and for the purposes of this study – ie analysis of

current crisis and necessity of transformation – the period was deemed to be sufficient.

Non-recurring items were decided to be included, since nearly all the sample pulp and paper companies have had significant restructuring costs, impairments and writedowns throughout the period in question. One can debate whether it would have been better to remove non-recurring items – however, unfortunately it seems that due to the on-going restructuring process these items are no longer non-recurring.

There are two different perspectives on whether to include non-recurring costs or not – one has to do with assessing the profitability of the on-going operations, whereas the other deals with the costs associated with adapting to a changed future outlook. For the purposes of analyzing the performance in the midst of an industry undergoing transformation, it is more logical to include non-recurring items.

The size of the sample was deemed to be sufficient for the pulp and paper companies and their suppliers. The 23 pulp and paper companies represent over 50 % of the global production capacity. Similarly, the machinery and pulp and paper chemicals suppliers included dominate the global supply.

However, the sample is not representative enough of the publishers, printers, merchants and brand-owners – there are over 60 000 printers in Europe alone. The sample does include many of the world's biggest and well-known firms in these sectors, so this should mitigate the issue. Reliability and validity of the results is discussed in chapter 12.

(3) Analysis of the factors contributing to industry's profitability is based on the results of profitability analysis, the cost structure of the industry and the unit costs of main production inputs in the main production regions. The analysis was further verified during interviews of 36 forest industry cluster executives, asking what in their opinion are the main issues facing the industry.

(4) Analysis of the paper value chain – from wood to end-user – is based on empirical cases calculated during 2007. These cases are production of an annual report in Finland, publishing of a women's magazine in France, distribution of office papers in Great Britain and sale of cigarettes in Germany. The added-value of each phase in the value chain was calculated in EUR / ton and the approach covered coated woodfree papers, uncoated woodfree, LWC and folding boxboard. The results were then verified by comparing the financial results of the companies participating in the value chain with the added-value of each step in the chain.

While the researcher acknowledges the fact that publishing or producing and selling a consumer product are different businesses than paper or board, paper and packaging

are significant cost factors to these companies and key product attributes of their offering. Furthermore, their negotiating power, quality and service requirements and willingness to pay a certain price are fundamental factors to the profitability and competitive environment of paper and board producers.

(5) In-depth interviews of cases on success or failure of paper industry turnaround cases. The researcher and his colleagues at Ernst & Young studied in detail 12 business turnaround cases within the European paper industry during 2007. These are all actual cases that had occurred between 1997 and 2006. It was decided, that although entire companies or their divisions have been turnaround targets, the most appropriate focus would be individual business units – paper and board mills. The countries included were Finland, Sweden, France and Germany.

The method of research was personal face – to face interview of key managers that had participated in the case, focusing on issues such as severity of the financial crisis, critical success factors, roles played by the top and mill managements, techniques used and whether the turnaround program was a success or a failure.

Case studies based on interviews can sometimes be risky as a formal research method. Factors such as personal bias of the interviewee, the time gap between the interview and the actual event can sometimes distort the results. Therefore, each case included more than one interviewee and whenever possible, results verified by the financial and other figures regarding the case. Additionally, the interviews were carried out personally instead of for instance a web-based questionnaire to detect any bias or lack of objectivity and using a standard list of questions. However, due to the nature of the topic and the time elapsed since the case, most of the interviews were confidential discussions rather than formal interviews using a strict protocol.

It must be noted, that due to reasons of confidentiality the researcher cannot provide a list of mills or of the interviewees in question.

(6) Interviews of senior managers within the pulp and paper industry cluster.

Altogether 36 interviews were carried out during 2007 by the researcher and his colleagues in the form of a standard questionnaire in Finland, Sweden, Germany, France, South Africa, India, China and the United States. The interviewees represented pulp and paper companies (18), machinery and chemicals suppliers (5), publishers, printers and merchants (10) and financial analysts covering the industry. The interviewees were typically senior executives at senior vice president or above levels, mostly with a financial, operations or a business development background.

20 interviews were carried out as personal interviews, 10 as a telephone interview and 6 via a mailed questionnaire. To ensure the reliability and validity of the results

the target was to conduct as many interviews personally or via telephone to ensure that the questions were defined and understood by the respondents in the same way. In formulating the final questionnaire, one test case interview was carried out.

The topics covered a wide range of issues, such as critical challenges facing the industry, R & D, consolidation, climate change and future outlook. The interviewees were asked to rank 60 specific issues in their order of importance from 1 (not important) to 5 (extremely important) under the categories global trends, industry challenges and industry future. This enabled a quantified analysis to be done and the results were then statistically analyzed.

While 20 of the interviewees were European, the companies they represented had production operations in North America, South America or Asia. This in addition to 16 interviewees from outside Europe mitigates the risk of a too much focus on Europe. The geographical backgrounds of the interviewees were checked against the results they had produced to ensure that there were not any geographical biases in the results.

The main elements of the methodology and their role in answering the research questions is outlined in Figure 2.

2. KEY THEORETICAL CONCEPTS

The key theoretical concepts that the study is based on and previous research on the topic are presented in this chapter. Their application to the research problem and the pulp and paper industry is presented in the chapters that follow. There is a wealth of management literature and research on areas such as strategy, globalization and transformation – these topics have been widely studied. Similarly, numerous dissertations and studies have been conducted on the technical aspects of the paper industry – for instance product and process development, environment and energy.

However, how they might apply to a particular industry and especially transformation of the pulp and paper industry has been far less researched. In fact, it seems that there are only a few post – graduate level dissertations relevant to the topic that have been published over the past 10 years, in addition to various articles and conference presentations.

2.1 Different schools of strategic thinking

“Strategy” as a term has been studied in various forms and contexts ever since the antiquities – especially from the military point of view. Obviously, this study is concerned only with the context of management theory, and from this perspective this field is relatively young – the key strategic concepts have been developed during the past 60 years or so.

Mintzberg and Lampel (Mintzberg and Lampel, 1999) have listed the following different schools of strategic thinking from the management perspective:

(1) *Design school*: strategy is based on achieving a fit between a company’s internal strengths and weaknesses with external opportunities and threats – such as in the commonly used SWOT – analysis. This was developed mainly by Selznick, Chandler and Andrews in 1950’s and 1960’s.

(2) *Planning school*: The most famous proponent of the planning school was Ansoff, and there are many similarities with the design school, which evolved at the same time. The basic difference is, that instead of developing a strategy based on conceptual thinking, analysis and planning and formal processes are given more weight.

(3) *Positioning school*: positioning strategy has roots also in military strategy, but its management applications began in the 1980’s through Porter’s work. Basically, in – depth analysis of a company’s position in an industry leads to generic strategic choices of differentiation, focus or cost leadership. The analytical aspects of this

school has resulted in many tools commonly used in management today, such as the analysis of value chains.

(4) *Entrepreneurial school*: entrepreneurial school emphasizes the role of a visionary leader, who has an intuitive vision of how to develop his company, instead of analyzing or formally planning a strategy. This has been applied in studying for instance start-up companies, turnaround companies or family- owned firms.

(5) *Cognitive school*: this line of thinking has its roots in studying the origin of strategies and the mental processes needed in creating new strategies. The base discipline is psychology.

(6) *Learning school*: during 1970's and 1980's several academics argued that strategy is an emerging process and that it evolves over time. New ideas and strategies can be found throughout the organization and formulation and implementation intertwine. Prahalad and Hamel are the more recent and best-known proponents of this school, which has grown quite influential among managers.

(7) *Power school*: the power school has its basic roots in political science. It considers internal strategy formation as a political process, involving bargaining, negotiations, confrontation etc and as a result of this process a winning viewpoint emerges. The external strategy is formulated in a similar fashion – the organization uses its power over competitors, partners and alliances in order to reach its goals.

(8) *Cultural school*: as opposed to the power school, the cultural school emphasizes cohesion, consensus, common interest and integration – strategy is a social process. This has been studied and used especially in Sweden and Japan, both of which can be characterized as cultures emphasizing consensus and harmony.

(9) *Environmental school*: this line of strategic thinking is based on biology and the environment. Rather than other schools which study how an organization can succeed in a certain environment and minimize the risks involved, the environmental school proposes that environment places severe limitations on a company, the environment is unpredictable and organizations need to adapt. Most likely recent research and attention on climate change has brought new interest in the environmental school.

(10) *Configuration school*: The configuration school considers strategy as a process of transformation – organizations consist of clusters of different states, characteristics and behaviour and change happens through transformation from one state to another. Configuration school has largely been the basis of company transformation theory.

All of the above schools have fundamental differences, and to this day there does not exist a single, universally accepted theory on strategic management. This seems to be an evolving process and the academic debate continues.

For the purposes of this study, it is important to note that management theory does not provide any “absolute truths”, there are “pro’s” and “con’s” to each theory and the applicability of each theory depends on the context and the business in question. However, it seems that for this study and the pulp and paper industry the positioning school and the configuration school are the most relevant – they deal with factors determining intensity of competition and the value chain, as well as transformation and change management.

2.2 Theories on competitive advantage and value chain

The leading advocate of the positioning school, Michael Porter (Porter, 1980) states that a company’s sustainable success is based on a unique and difficult to imitate position along three generic dimensions: cost leadership, differentiation and focus (either on cost leadership or on differentiation along a narrower scope). The theory states, that companies must make a choice between the above strategies – companies that try to do everything end up in a “me-too” position, which is not tenable for the long term.

The choice of strategic position depends on the industry the company is competing in, as well as its own competences, resources etc. According to Porter, the intensity of competition is determined by 5 forces, which are depicted in Figure 3 – the fifth force which represents the competition between existing firms is shown in the center of Figure 3.

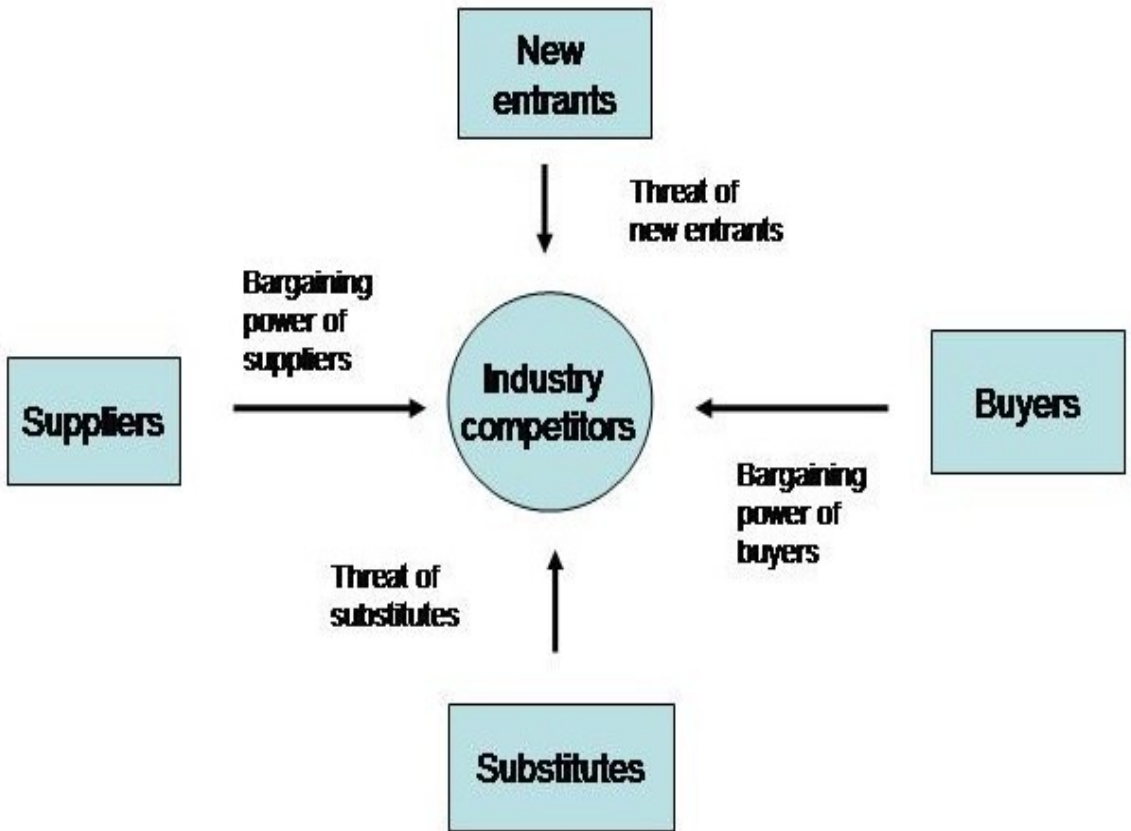


Figure 3: Determinants of the intensity of competition (Porter, 1980)

The bargaining power of suppliers and customers has a significant impact on the rivalry between the existing competitors. If, for instance, the industry is fragmented with no clear market leaders and the customers are highly consolidated with only a few major players, it is quite clear that the buyers enjoy a significant edge in price negotiations etc. Similarly, if suppliers are very fragmented and weak, the industry enjoys a significant advantage. If either suppliers or buyers pose a credible threat of forward or backward integration, they tend to have higher negotiating power. The level of switching costs is another factor determining buyer or supplier power.

If the entry barriers to the industry are low – meaning that there are no specific proprietary technological knowhow, patents etc needed or if the economies of scale or capital requirements are not high, the threat of new entrants has a significant effect on the intensity of competition. Similarly, if access to distribution is not blocked or there are no government policies in the form of tariffs or other requirements in place inhibiting entry, entry barriers may be low.

Similarly, if there are substituting products or services that can more or less equally satisfy customer requirements, the impact on rivalry between existing firms is significant. If the product or service is an important part of the buyer's own business or expensive, the threat of substitution increases.

Finally, the nature of the industry itself has an impact on competition intensity. An oligopolistic competitive situation with only a handful of suppliers might be less intense, than an industry with several more or less equal players. An industry that suffers from low growth, the products and services are interchangeable or capacity is typically added on a large scale, is prone to have intense competition between the existing competitors.

Porter's value chain concept is another widely used and popular theory. According to Porter, the ultimate goal of any strategy is to generate value for customers – without value, the activities that a company performs to produce a product or a service is meaningless to the customer.

Thus, every company's performance consists of a set of activities – either primary activities such as production and sales or support activities such as technology development etc. The goal of each activity is to add value either directly or tacitly to the end – product or service, which is then sold forward to a customer at a profit. The customer in turn uses the purchased products or service as an input to its own value chain. Ultimately – after several similar chains increasing the value– the entire value chain ends up at the end user or consumer. This is shown in Figure 4. The application of the value chain theory is discussed in chapter 5.

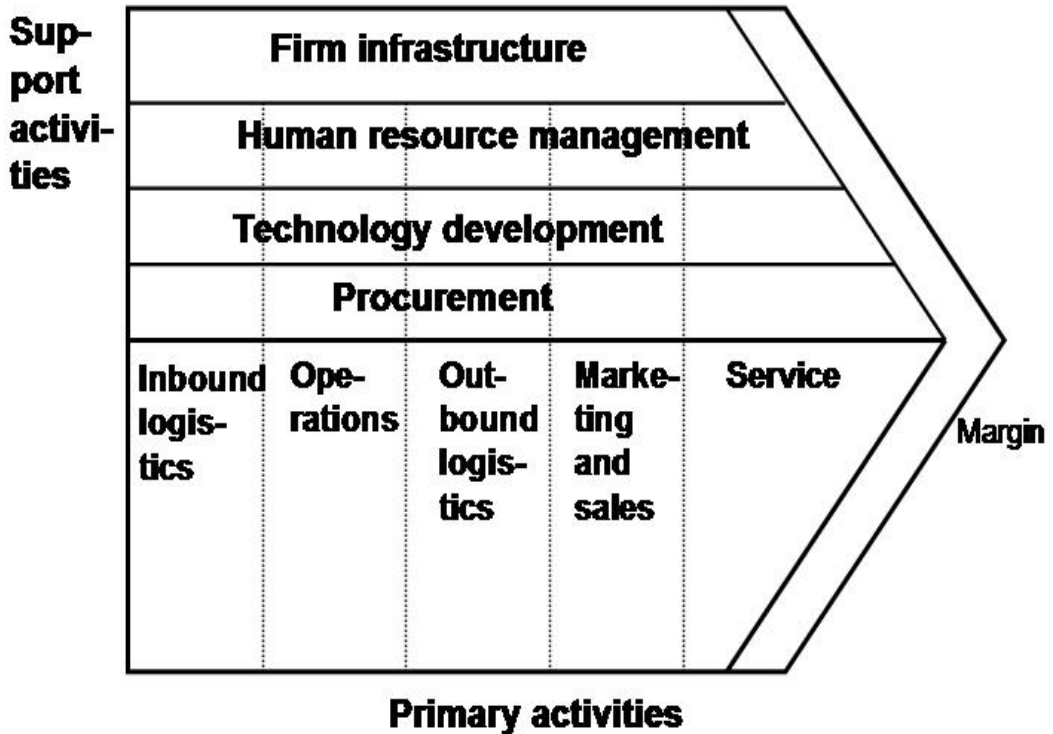


Figure 4: Porter's value chain (Porter, 1980)

While Porter's theories on competition in industries, generic strategies and value chains are considered major advances in strategic management and are widely used, they have also been criticized. One criticism that has been raised is, that they place too much emphasis on industry-wide or external factors. According to criticisms, equally important elements in success are the firm's internal resources and competences. But as this study focuses on an entire industry – pulp and paper – rather than individual companies, Porter's theory is valid for the purposes of this research.

2.3 Theories on change and transformation management

It is often commonly stated, that the “only thing in life that remains constant is change” and that “the pace of change is quickening”. Considering some of the tumultuous events between 2000 -2009 such as the terrorist attacks of September 11th, rising awareness of climate change and the current financial crisis, the above statements certainly seem to be true.

As far as business and management is concerned, change is inevitable and companies need to take that into account in their strategic thinking. The school of strategic thought that emphasizes this is the previously mentioned configuration school –the leading proponents being Mintzberg, Quinn and Hamel.

There are many sources of change:

- (1) Technological change
- (2) Consumer behaviour
- (3) Globalization
- (4) Demographics
- (5) Environment
- (6) Politics.

Some manifestations of these are for instance emergence of China, wood export tariffs imposed by Russia, rise of the electronic media and carbon trading – all very relevant to the pulp and paper industry.

Internal change – or transforming organizations – usually is necessitated when a company has failed to adapt to one or more of the above external changes, resulting in declining profitability, loss of market position etc. There can be other reasons as well, such as ownership or management changes.

Mintzberg argues that change has to be holistic, as shown in Figure 5.

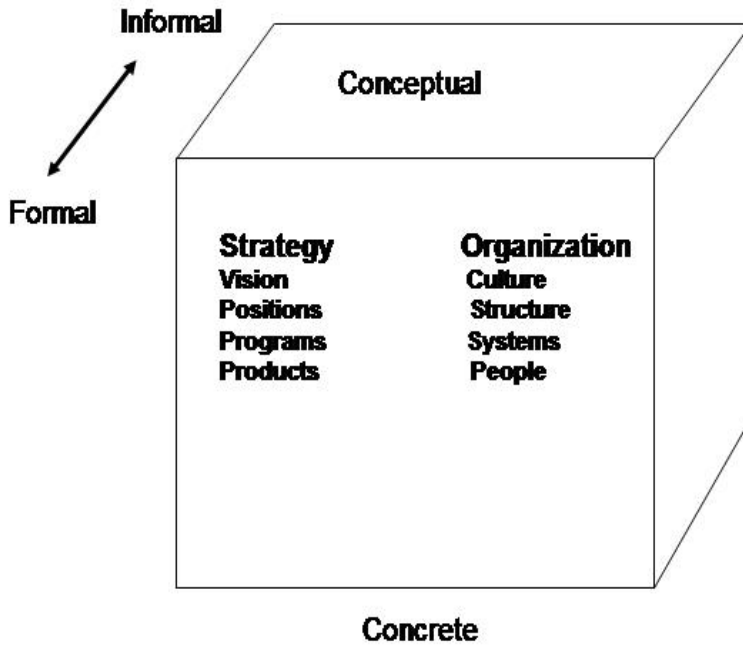


Figure 5: Holistic change management (Mintzberg, Ahlstrand, Lampel 1998)

According to Mintzberg, change can be either conceptual or concrete – ie changing strategy vs changing some product properties. Similarly, change can be either formal or informal – for instance formally announcing a change in strategy vs changing the strategy slowly and incrementally.

Change has to be holistic - a change in strategy or organization without changing all the other factors listed in Figure 5 such as programs or systems, does not lead to a sustainable change. A formal announcement of a major change without making all the necessary other changes that would facilitate implementation, is often just an empty, grandiose gesture.

Change can be implemented in many ways. There are two basic, opposing views on the most appropriate method: top-down or bottom-up. Bottom-up change consists of joint analysis of the problems involving middle management and employees, thereby mobilizing the commitment to change. Thereafter shared vision is formulated and widely communicated, actions are agreed and then institutionalized with new policies and systems and progress is monitored (Beer, Eisenstat, Spector 2001).

Top-down change takes a different approach. Top management instils a sense of urgency or crisis throughout the organization and builds a coalition – a change team – to implement and overcome resistance. The next steps are creation of a powerful, compelling vision which is effectively communicated, planning and creating short-term wins and thereafter consolidating and institutionalizing change (Kotter, 2000).

There are a multitude of ways and different tools to implement change. Once again, there is no universally accepted theory and for instance both the “top-down” methods and “bottom-up” methods have their own proponents, both within academic research and various management consultants. Which method and technique to use depends on the business, its particular circumstances and problems.

According to several studies, most major transformation programs fail to meet their objectives. This applies to mergers & acquisitions, major IT projects, cost efficiency programs and outsourcing, among others. In a survey carried out by MORI Captains of Industry and Department of Trade & Industry (UK) in 2007, 73 % of leading executives agree that “their business is increasingly challenged to assess risks and returns of their major programs”. Similarly, Gartner Group has estimated in 2007 that “more than 66 % of large scale projects fail to achieve their objectives.” According to research, 70 to 80 % of mergers and acquisitions fail to increase the shareholder value (Selden and Colvin, 2003)). A recent survey by McKinsey regarding success rate of transformation programs resulted in an overall success rate of one in third regarded as successful (McKinsey Quarterly, 2008). It is clear, that transformation and change are extremely challenging and most initiatives of this nature fail.

Most studies agree, that some of the critical success factors for transformation programs are creating a compelling vision, with clearly articulated goals, effective communication, top management support and realistic expectations and time frames. How these issues apply to the pulp and paper industry is discussed in chapter 8.

In this section, “change” has been used instead of “transformation”. Both terms refer to the same thing – the main difference is that “transformation” focuses on more dramatic and bigger issues, whereas “change” encompasses also smaller and incremental issues.

2.4 Theories on product lifecycle and innovation

Innovation is a complex and widely –studied area, and a comprehensive review of innovation theory is beyond the scope of this study. Only the aspects that are most relevant to the research questions are presented here.

There are many forms and definitions of innovation. Incremental innovation refers to basic product and service improvements, that may extend the life-span of the product. They involve the adaptation, refinement and enhancement of existing products and services and/or production and delivery systems. These are typical in a capital intensive, traditional industry such as paper, steel or oil. Radical innovations involve entirely new product and service categories and/or production and delivery systems (Burgelman, Christensen, Wheelwright 2004).

Disruptive innovation refers to the emergence of a disruptive, new technology that may undermine the position of the leading existing firms in an industry (Christensen, 2003). An example of this is the internet and its subsequent use in many areas, such as publishing and mail-order business.

Finally, the term business concept innovation (Hamel, 2002) refers to both radical and extensive innovation, that encompasses innovation of entirely new business systems in addition to reconfiguring products and services. This typically involves rethinking the entire way of doing business. Hamel provides numerous examples of companies that have successfully reinvented the business – unfortunately, one of the companies he praised in innovation was Enron, which famously collapsed in 2001 due to extensive accounting malfeasance. In any case, Hamel’s framework for challenging the status-quo and the dominant paradigms and reinventing an industry is very interesting and could have use for troubled businesses such as pulp and paper.

The commonly adapted product lifecycle is depicted in Figure 6. According to theory, most – but not all - products eventually experience a similar curve from introduction and growth to maturity. Eventually decisions have to be made to rejuvenate the product or service, through product modifications, marketing etc. The example in Figure 6 is from grocery business, which is relevant for packaging boards and tissue.

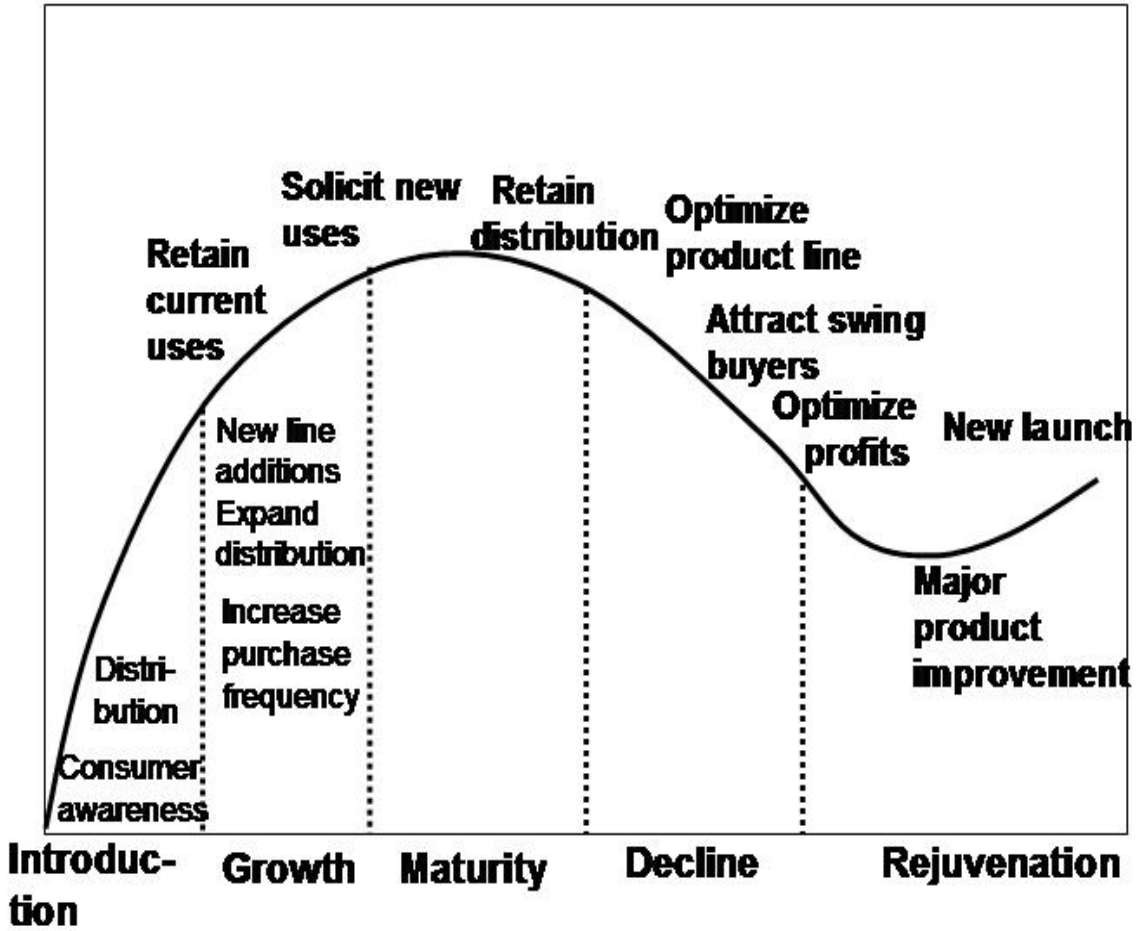


Figure 6: The product life cycle curve of a grocery business (adapted from Kotler 1984)

Another variation of the product life cycle is the so-called commoditization curve shown in Figure 7 (Rangan, Bowman 1994).

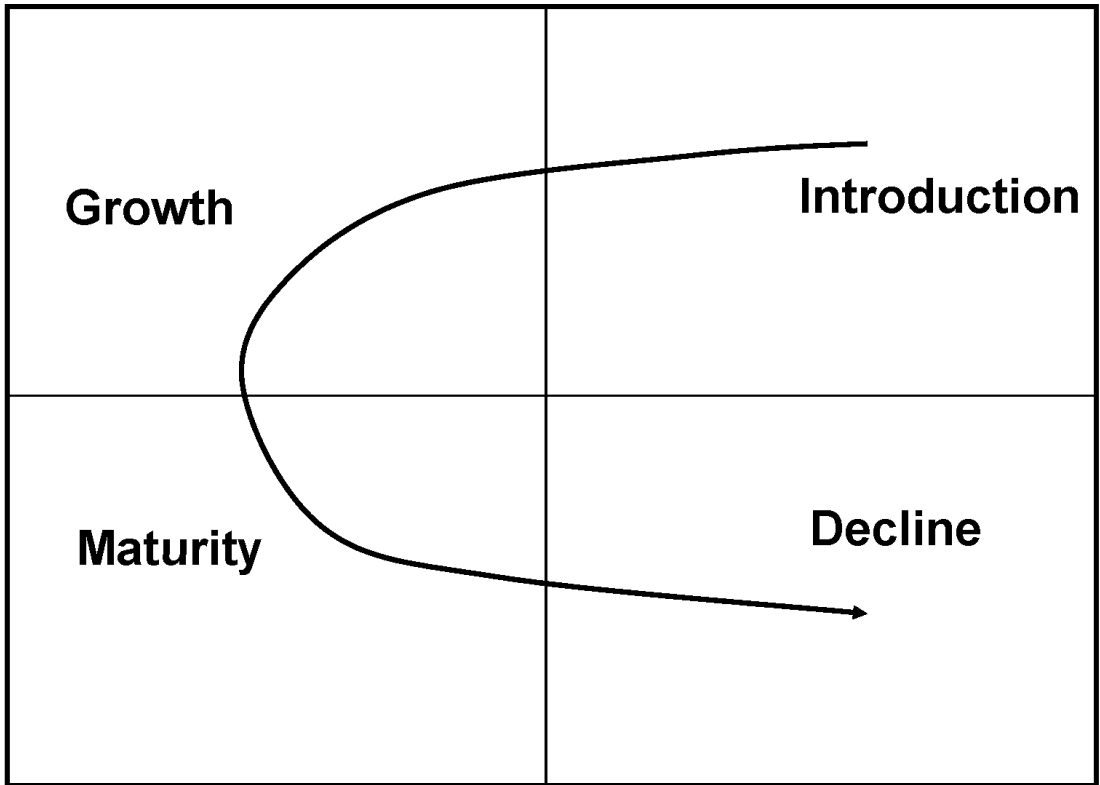


Figure 7: Commoditization curve (Rangan, Bowman 1994)

According to the commoditization theory, each product costs more at its introduction stage, due to limited production, early phase in the learning curve, technical service needed for customers etc. Eventually, at the decline stage costs increase again – customers demand product modifications and better service without any more being willing to pay more for the better performance. The product has become commoditized, and after this it is extremely difficult to change the position- an entirely new product is needed or the entire business system needs to be reengineered.

It seems, that most pulp, paper and packaging products belong to the commoditized category – market growth in North America and Europe is below GDP growth, price differentials between suppliers are marginal at best, switching costs are low and

negotiating power lies with the customers. Radical changes are needed, if a supplier wants to break away from this situation.

Product life cycle theory has also been criticized. The actual shapes of different product life cycle curves may vary from product to product and the different stages have different, unpredictable durations. It cannot be used as a tool for forecasting the behaviour of a particular product over its lifetime. But it has been established, that products undergo the four phases of development from growth to maturity and decline.

Pulp and paper industry has recently been heavily criticized for neglecting to invest in research and development and new innovations. The industry spends on average 0.7 % of sales directly on R & D, whereas in many other industries the share is much higher. However, one should also take into account the R & D spending of the machinery, chemicals and automation & control suppliers, which spend considerably more on R & D. Table 1 outlines the main differences between “low tech” process industries and “high tech” industries such as electronics or telecommunications.

Table 1: Comparison of R & D issues between low-tech and high –tech industries (Ebeling 2008)

	Low tech	High tech
Competition criterion	Price / quality	Innovation
R & D intensity	Low	High
Innovation focus	Process	Product
New production processes	Require piloting	Easily scaled
Scale of innovation	Incremental	Fundamental
Source of innovation	Knowledge from other sciences and industries	New information is self-made
Patenting	Low	High
Type of knowledge	Tacit	Practical, theoretical, codified
Type of learning	Learning by doing, problem solving	Searching and exploring
Skills and competences	Practical knowledge and skills	Theoretical knowledge, cognitive skills
Cooperation	Customer-producer	University - producer

Another important feature of innovation in the pulp and paper industry is the need for piloting. New products and production processes must be tested in an industrial environment prior to investing in new mills – this is depicted in Figure 8:

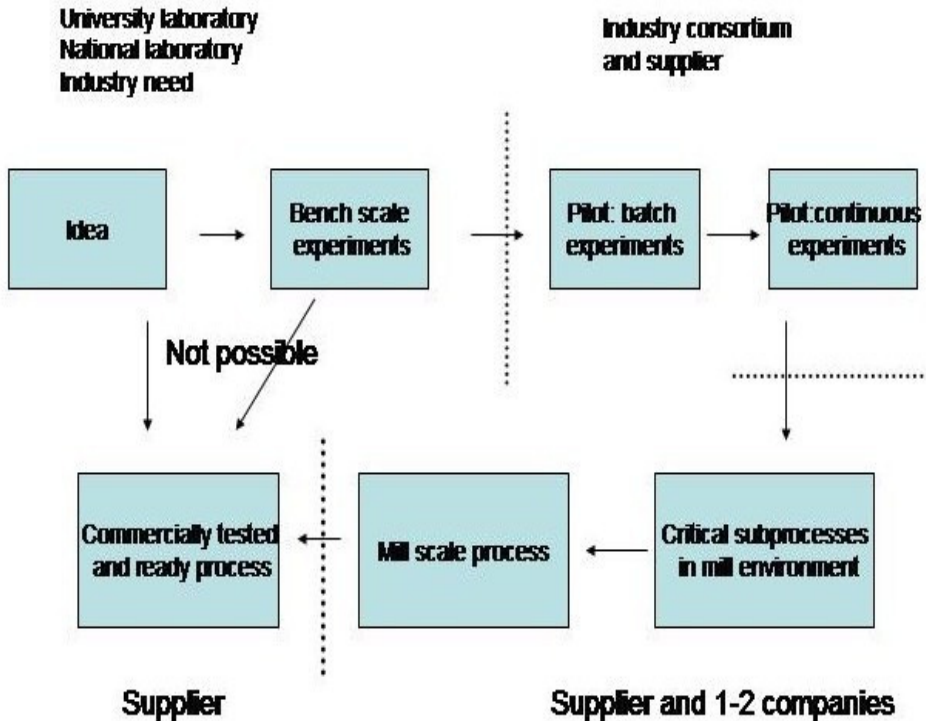


Figure 8: New product development process in an industrial environment (Ebeling, 2008)

Contrary to many other industries such as electronics, it is usually not possible to develop a new product and production process without large scale piloting. This means, that the product development process is much more time consuming in a process industry such as pulp and paper.

Paper industry has responded to the current profitability situation and calls for more innovation by intensifying its innovation efforts. For instance, the Finnish pulp and paper industry has created a new and ambitious R & D strategy, which states that the industry cluster will remain the leading pulp and paper innovator until 2030. To facilitate and coordinate this the industry has established a joint organization – Forest Cluster Oy –in 2007. Similar initiatives have been launched also on the European level, in the form of pulp and paper technology platforms.

The industry is currently developing a number of new product ideas. These range from biorefineries to smart packaging, RFID tags and nanofiber. However, as promising and necessary as these new product ideas are, developing them into commercially viable production processes will inevitably take many years, as has been outlined above. Until then, the industry will have to operate in the very challenging mature or declining segment of the product life cycle.

2.5 Theories on industry consolidation

The importance of market share and its correlation with financial performance has been studied widely. However, higher market share does not automatically translate into better profitability. At least two preconditions have to be met: unit costs decline in line with higher market share and volume, or the market leader offers a superior product and is able to charge a price premium (Kotler 1984). These conditions are not always met.

Figure 9 shows the degree of consolidation of different industries (Kroeger et al, 2008). The degree of consolidation is presented as the combined market share of the three biggest companies in the world. As can be seen, pulp and paper is one of the more fragmented industries. Although the results of Figure 9 are based on results from 2001-2002, there have been relatively few big mergers in the industry since then, so the relative position of the industry is most likely still as shown.

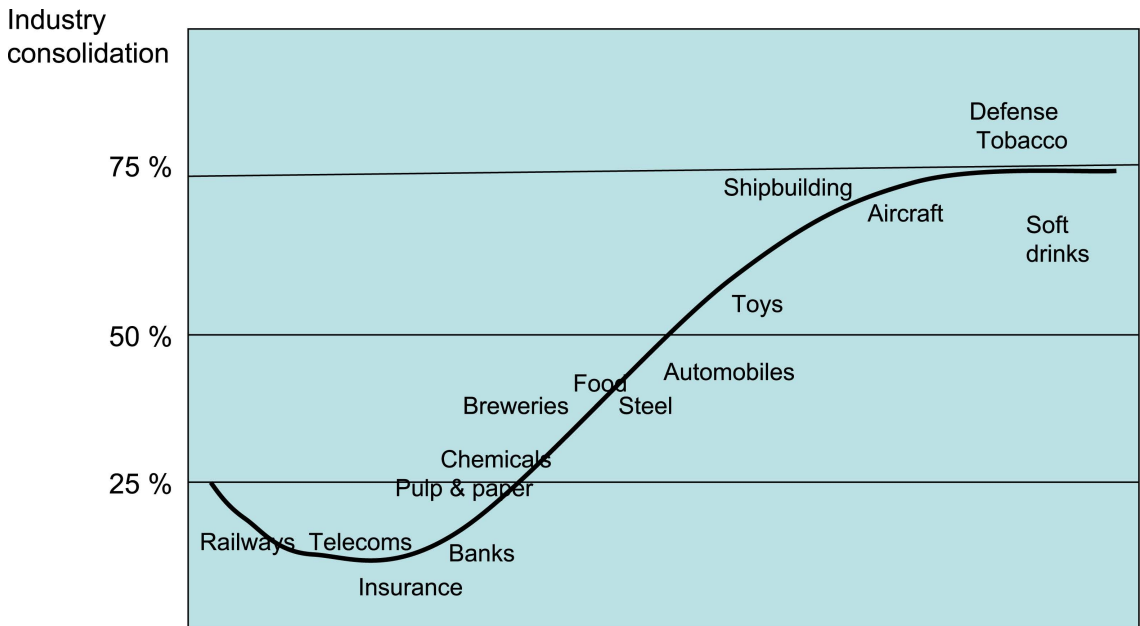


Figure 9: Consolidation degrees of various industries (Kroeger et al, 2008).

There are basically two commonly used measures to estimate the degree of concentration in an industry. These are the market concentration ratio – which calculates the market share of the top companies - and the Herfindahl index which is defined as the sum of the squares of the markets shares of all the companies. A common concentration degree is the C5 – ie, the total market share of the top 5 companies.

The Herfindahl index was developed to take into account the fact, that if one company has a significantly higher market share than for instance the next four, the C5 index does not adequately describe the actual consolidation degree and competitive situation. There are very few cases within the paper industry where a single producer in a given grade or region would have a market share exceeding 40 – 50 % - therefore the concentration ratio is appropriate for analyzing paper industry.

Despite waves of consolidation during the past 20 years, there were still 756 pulp and paper companies in Europe alone (CEPI statistics 2008) in 2008. Most of these are obviously very small and the biggest companies clearly dominate the market – but it is clear that many other industries are far more concentrated. However, the degree of consolidation varies between regions and different grades. The capacity shares of the 5 biggest producers in the main product groups is shown in Table 2.

Table 2: Capacity shares of the top 5 producers in Europe and North America (Diesen 2007)

<u>Product group</u>	<u>North America</u>	<u>Europe</u>
WFC	85	70
WFU	80	50
Newsprint	70	65
Uncoated mechanical	70	80
Coated mechanical	70	75
Cartonboard	60	50
Containerboard	35	60

According Porter's theory on competitive advantage, some of the reasons for fragmentation are the following:

- (1) Low entry barriers or high exit barriers.
- (2) Lack of power advantages over suppliers and/or customers.
- (3) Limited economies of scale or scope.
- (4) Regional issues such as high transport or inventory costs.
- (5) Regulatory issues.

All of these factors do not necessarily apply to the situation in pulp and paper. However, points 1,2 and 4 are valid also for pulp and paper.

Successful consolidation depends on a number of preconditions, that an industry must fulfill (Briesemester, Fisher 1998) in order to be fit for consolidation:

- (1) Creation of competitive advantage for the consolidator (economies of scale, for instance).
- (2) Customers and competitors are receptive (or at least do not have the means to block the consolidation move).
- (3) Access to capital is restricted.
- (4) Cultures and regions are compatible.
- (5) Change catalysts – in the form of for instance changing regulations etc – are unlikely. In other words, the industry is in a fairly static stage.

In addition to above, successful consolidation depends obviously also on implementation. As was previously stated in section 2.3, most M & A transactions are not successful – this obviously has big implications in terms of the attractiveness of consolidation as a solution to industry's problems.

Theoretically, consolidation would bring several benefits to the pulp and paper industry:

- (1) Enhanced pricing power towards customers.
- (2) Better capacity control.
- (3) Lower fixed costs.
- (4) Better access to capital.

Many pulp and paper products are regionally quite consolidated – for instance, LWC in Europe. However, this has yet to lead to a better profitability. If EU and North American competition authorities allow it, bigger companies acquiring their smaller competitors and simply shutting down excess capacity could lead to improved profitability.

2.6 Theories on globalization and emerging markets

Globalization, multinational companies, their structures and the internationalization stages of a firm are all widely researched topics in management theory. Only a brief summary of the main theories is presented here and thereafter a more thorough treatment of the emerging markets is presented.

According to Melin, there are three alternative theories on the internationalization process of companies (article by Melin in Vernon-Wörtzel, 1997). These are the sequence –stage theory, strategy and structure theory and internationalization as a management process.

Sequence – stage theory proposes, that a firm internationalizes based on a sequence of different stages. Vernon (Vernon, 1979) links the internationalization process to the product life cycle theory: during the introduction phase of a new product, sales are mostly domestic, and during the growth phase the company begins to actively export and also begins to get involved with investments abroad to increase volume and gain economies of scale. During the maturity stage when markets are becoming saturated the company shifts production to low-cost countries and in the final decline stage the company leaves its home country entirely.

Vernon's theory seems to apply best to products that have a long life cycle and to companies that do not have previous production abroad. Many pulp and paper companies meet these prerequisites.

Another stage-model is presented by Johansson and Vahlne (Johansson & Vahlne 1990), which emphasizes a learning process of internationalization. Each firm goes through a number of logical and incremental steps in acquiring, integrating and use of knowledge about foreign markets. As the “psychic distance” – culture, business practice, legislation etc - between the company and export market becomes shorter over time, more and more complex internationalization forms are enacted. According to this model most firms start international operations with the markets they know best, which are often their neighbouring countries – ie USA and Canada, Finland and Sweden etc.

Both stage-model versions have also been criticized for their limitations. They tend to describe the development as a kind of inevitable, logical progression of different stages, with each preceding stage as a precursor to the next stage. Individual firms may adopt different and faster approaches, and often unexpected and unforeseen events may disrupt the sequence of different stages.

The strategy – structure theory on internationalization is based on Chandler's theory on strategy and structure (Chandler 1962) – structure follows strategy. One of the main thesis of Chandler was that, diversified companies in the 1960's experienced organizational challenges which ultimately led to new structures. This has been applied to internationalization theory so, that internationalization is considered a form of diversification.

The evolutionary path of internationalization of many companies thus led from an initial phase of more or less independent international subsidiaries, which as their size and importance grew were bundled into an international division to exercise control and coordination. This in turn eventually led to a global structure, with global product and regional structures – some companies especially in Europe skipped the international division structure and implemented a global structure directly from the

independent subsidiary structure. This theory also has its limitations – for instance link between strategy-structure and performance has not been clearly established, and managerial skills and competences may have a bigger impact on performance than structures.

The process school of international management – focusing mainly on diversified multinational companies – has been developed by Doz and Prahalad (Doz, Prahalad 1987). Their research has focused on the organizational aspects of multinational companies – specifically the issues on global integration vs local autonomy and specifically what they mean for individual managers. As a result of their studies of numerous multinational firms, different structures and control mechanisms such as a matrix, transnational firms with integrated networks, heterarchies (as opposed to hierarchies) and various others have been developed.

The theory emphasizes the dynamic dimensions of strategy and structure. However, even within the process school this leads to different organizational outcomes – it seems there is no one universal or ideal model that would apply to all or even most industries and companies.

During the past 10 years, international management theory has increasingly focused on the emerging markets, most likely due to their growing economic importance and special characteristics. This is especially true for the so-called BRIC –markets, which is an abbreviation for Brazil, Russia, India and China.

The BRIC – countries and a number of other countries in South-East Asia, South America and Central Eastern Europe have experienced high economic growth and they have become vital parts of the global economy. This applies especially to China. It must be emphasized, that each of these countries is very different from one another and the cultures, languages, ways of doing business and political systems vary – however, they also share a number of common characteristics and growth drivers.

These are the following:

- (1) Large population and a sizable well-trained workforce.
- (2) Substantial, growing and affluent middle-class.
- (3) Economic reform and deregulation.
- (4) Substantial foreign direct investment over the past 10 years.
- (5) Abundant natural resources – in the form of oil, gas, minerals, coal or forests
- (6) High savings rate and large accumulated capital reserves.

Due to the above factors, most economic forecasters such as the International Monetary Fund (IMF, 2009) have forecasted that these countries would resume their high GDP growth once the current financial crisis and turmoil is over.

Most Western companies have been and continue to be very interested in gaining a strong presence in the BRIC – markets. However, there are several risks and obstacles for successful business involved. Some of these are listed in Table 3 (Ernst & Young 2009).

Table 3: Differences in business practices between the Western and emerging markets (Ernst & Young 2009)

<u>West</u>	<u>Emerging markets</u>
Market data is usually reliable	Market data not available or unreliable
Accounting and financial figures are reliable	Reliability varies from market to market
Existing customers and their needs are known	New customers, local needs
Cost structures are known	Often unexpected costs
Well-functioning capital markets	Weak capital markets
Usually clear corporate governance	Corporate governance varies
Permits and licenses easy to obtain	Permits and licenses bureaucratic and unpredictable
Contract enforceability is strong	Contract enforceability is weak.

As is clearly outlined in Table 3, there are considerable differences between business practices between North America and Europe and the so-called BRIC – markets. Once again it must be emphasized, that the above list is a generalization – for instance there may be companies in the West with a weak or unclear governance structure and companies in the BRICs with a very clear structure.

Despite the challenges, the interest of Western companies remains huge. The strategic reasons why companies are keen on these markets has recently been studied by Ernst & Young and shown in Figure 10:

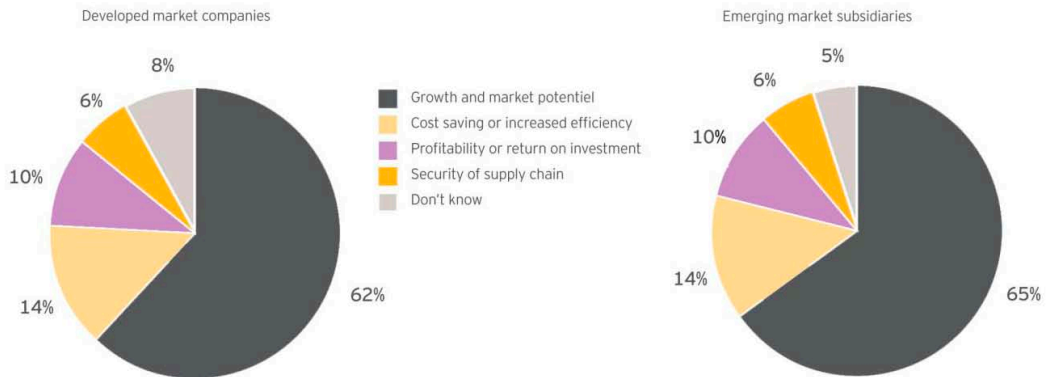


Figure 10: Strategic objectives for investments in emerging markets (Ernst & Young, 2008).

As can be seen, the overwhelming majority or 62 % of the companies interviewed stated growth as their primary motive for investing in the BRICs. Perhaps surprisingly, lower costs or increased efficiency was stated only by 14 %.

To succeed in the emerging markets, companies must adopt different strategies and business operations than they would do in their home countries, if they wish to build a strong market presence in these countries.

Some of the critical success factors are listed in the following (Pacek and Thorniley, 2007):

- (1) Form of entry – acquisition, greenfield or a joint venture ?
- (2) Emerging markets must be an integral part of the global strategy.
- (3) Commitment from top management must be ensured.
- (4) Realistic long-term targets – long term perspective needed.
- (5) Flexibility – adapt to the local market.
- (6) Relationships – both commercial and government – are crucial.
- (7) Cultural understanding – arrogance is a recipe for disaster.
- (8) Understanding of local competition and customers.

(9) Localize decisionmaking when possible.

In addition to above, many other factors need to be considered. Some of these are directly related to the transaction such as careful and extensive due diligence, tax issues, risk analysis and corruption and fraud.

Finally, although the main interest both for industry and research focuses on the “BRIC-markets” – there are many other interesting and growing markets that companies should not neglect. Some of these are Vietnam, Indonesia, Turkey and Mexico – often cited as the “the next BRICs”.

2.7 Previous research on the topic

There is a huge wealth of academic research on issues like competitive strategy, innovation, globalization and business transformation. However, there is relatively little research on their application to any specific industry and even less on pulp and paper industry. Despite an extensive database search, only a number of post-graduate level dissertations which are relevant to this study were found. Considering that the pulp and paper industry’s challenges have received a great deal media attention and the importance of the industry at least in the Nordic countries over the last 5 years, this is somewhat surprising.

Rohweder’s (Rohweder, 1997) doctoral dissertation focused on product reorientation in the Finnish paper industry in 1997. A conceptual framework and model for analyzing factors that contribute to successful new product development was created. Interviews with 34 key managers in the industry formed the empirical part of the research.

The main findings were, that the success of new product development projects mainly depended on internal factors, such as the execution of the project, paying enough attention also to the “soft” aspects of development such as marketing and market research. The success of a new product is therefore mainly within the control of the company, rather than external circumstances.

Siitonen (Siitonen, 2003) studied the impact of globalization and regionalization strategies on the performance of the world’s pulp and paper companies in her doctoral dissertation in 2003. A model outlining key criteria for the degree of globalization was created and tested against an extensive analysis of the key performance indicators of the top 100 pulp and paper companies. A qualitative analysis based on 36 industry interviews was also carried out.

Siitonen's main findings were the following:

(1) Pulp and paper is still the early stage of globalization, and most companies can be characterized as either intra-regional (production on only one continent) or inter-regional (production on two or more continents).

(2) The step from a successful intra-regional strategy to a global one requires significant managerial resources and seems to take time.

(3) Company financial performance correlates positively with the progress of globalization.

(4) Contrary to popular belief, a product focus strategy does not seem to lead to better performance than a related-diversification strategy. Companies considering going global need to think carefully which approach to take – a focus or a related-diversification strategy.

It is debatable whether points 3 and 4 are valid today – there are a number of regional and focused pulp and paper companies that financially outperform their bigger, more diversified and more global peers.

Haarla (Haarla, 2003) studied product differentiation and whether it provides a competitive advantage for a printing paper company in her doctoral dissertation in 2003. Additionally the study aimed to provide an answer to the following: does product differentiation provide a competitive advantage and how should a differentiation strategy be organized and implemented. Methodology was based on 37 industry interviews and case studies.

The main findings were, that product differentiation can be a source of competitive advantage if it is based on coordinated use of various knowledge, skills and capabilities within the firm and understanding of customer's earnings logic and future needs. Brand building could be used more effectively to support product differentiation. Haarla's conclusions are noteworthy, because they indicate that even in a commoditized business such as printing papers novel and different approaches are possible – albeit under certain preconditions.

Pohjakallio's doctoral dissertation (Pohjakallio 2000) on implications of industrial concentration on industry's conduct and performance with the case of North American paper industry in 2000 is relevant and important from the viewpoint of also this study. Consolidation is an issue that continues to be extensively discussed in the paper industry as a potential cure for the poor profitability. Pohjakallio studied based on operations analysis the structure, financial results and performance of companies between 1977 and 1998, covering 72 % of the North American capacity and main

paper and board grades. The theoretical base of the study was the Cournot-Nash capacity change model and the theory of collective strategy. The main conclusions relevant to this study are listed in the following:

- (1) Decision-making entity size is positively associated with absolute capacity reduction quantity – meaning that the bigger companies reduce more capacity in order to balance the market than the smaller companies.
- (2) Decision-making entity size is negatively associated with increase in capacity - meaning the company size does not correlate with investments to increase capacity.
- (3) Small decision-making entities increase more capacity in relation to their prevailing aggregate capacity than bigger decision-making entities.
- (4) Industrial concentration is negatively associated with price volatility. In other words, degree of concentration does not seem to have impact on price volatility.
- (5) Industrial concentration's association with price received mixed results, with inconclusive evidence that higher consolidation would lead to improved pricing.
- (6) During weak market situations capacity adjustments are not associated with industry concentration. There did exist a correlation between level of exports and weak market situation, indicating that during a weak market situation capacity was not adjusted through closures but through exports.

The most interesting and important result in Pohjakallio's research is the impact of industry consolidation on pricing and capacity adjustment during weak market situations. The results regarding concentration and pricing were mixed and highly dependent on the market share of the market leader.

Pohjakallio's extensive and impressive empirical study provided evidence that consolidation has during the studied period of 1977 and 1998 resulted in certain benefits to the industry. But the most crucial ones from the viewpoint of improved profitability and supply and demand balance – pricing and capacity adjustment – were not conclusively supported.

Strang (Strang, 1998) studied the turnaround process in a doctoral dissertation in 1998, using a case study approach of 6 turnaround cases in the Finnish industry between 1990 and 1995. The disguised cases represented 3 turnaround failures and 3 successes in different industries, with turnovers ranging from 2.5 M EUR to 100 M EUR. It is unknown whether any paper industry companies were included and the companies were independent legal entities rather than business units of larger

companies. The six cases were then tested against a test group of 18 randomly selected companies that had experienced financial distress in the same period of time.

Strang developed 12 hypotheses regarding the critical factors of a turnaround process, which were supported by the case studies and the test data. The most relevant findings from the viewpoint of this research are the following:

(1) The companies' external environment changed and the management was unprepared for it, resulting in the crisis and subsequent turnaround process.

(2) The companies had built risk exposures, for instance with regard to dependence on a single customer or a supplier or a high – level of indebtedness.

(3) Three conditions for a successful turnaround were identified: a realistic business plan based on the assessment of the external environment and the firm's capabilities, the business plan was sufficiently financed (with investment funds released in line with meeting the plan's targets) and a capable managing director trusted by the board of directors. The study stresses the role of the board – an alert and involved board representing the owners increases the chances of success.

(4) The successful turnaround cases often involved management changes and a simultaneous and powerful application of a variety of different turnaround actions ranging from cost efficiency, focus on core products and businesses, marketing and product development.

(5) The failed turnaround cases typically involved turnaround attempts by the existing management that consisted of trying to implement the previous plans more vigorously – in other words, change and actions were incremental when more drastic changes were needed. Also, the study indicated that the unsuccessful turnaround cases did not have a thorough and realistic business plan and the actions taken were more narrow than in the successful ones, which used a wide variety different actions.

Although Strang's study did not focus specifically on the pulp and industry and the case studies concerned independent legal entities with governance structures such as boards of directors, the results are very interesting and to a large extent in line with the findings of this study regarding paper industry turnarounds.

Näsi, Lamberg, Ojala and Sajasalo (Näsi et al 2001) studied the strategic development paths of Finnish forest industry enterprises during the 20th century in 2001. The study is a historical one, outlining the strategic paths that UPM Kymmene, Enso Gutzeit and Metsäliitto followed starting from their establishment until year 2000. The main findings are, that during the course of their history, the Finnish pulp and paper industry has rapidly consolidated (in 1985 there were 20 pulp and paper

companies in Finland, in 2009 there are four major independent companies) and the development has been characterized by different phases such as diversification and more recently internationalization. The main shift has been from a group of smaller companies focused on production towards a few globally operating big enterprises with corresponding future management challenges.

Other relevant research includes the scenario planning studies by Kettunen, Meristö and Hagström-Näsi, titled “Future scenarios of Finnish forest industry cluster, 2000” (Kettunen et al, 2000). The study identified six different development scenarios based on variables such as global development, economic development of Europe and Finland, energy, raw materials, logistics, environment and technology.

Based on the scenarios five alternative development paths were outlined. It should be noted, that the study itself did not predict any single scenario or a probable development path, but rather a list of possible outcomes. Some of the risks that were identified were low or even declining growth of some paper grades due to electronic media and increased recycling which could lead to weaker position for products made from virgin fiber.

With hindsight it can be stated, that the current state of the pulp and paper industry is not directly included in any of the identified scenarios, but rather a combination of some of these.

A more recent scenario study has been carried out by Häyrynen, Donner-Amnell and Niskanen regarding direction of globalization and alternatives for the Finnish forestry sector (Häyrynen et al, 2007). Several different alternative scenarios were developed using the Delfoi method. Although viewpoint of the study is a Finnish one, it includes several interesting results based on the 52 industry participants of the Delfoi – survey. Some of the relevant ones (from this study’s viewpoint) are the following:

- (1) 71 % of the respondents estimated, that the demand of paper and board in the emerging economies such as China and India will increase either faster than today or at the same pace as today until 2025.
- (2) 60 % of the respondents estimated, that the costs of tropical plantation wood will increase somewhat or significantly due to higher demand than supply.
- (3) The majority of the respondents – 61 % - considered that it is either unlikely or very unlikely that new products can double the value of forest industry production by 2030.

The impact of electronic media on publishing has been studied in Sweden by Appelgren (Appelgren 2007) and Leckner (Leckner, 2007). Appelgren’s doctoral

dissertation studied media convergence and digital news services and the opportunities presented to newspaper publishing via multiple channels. The main findings were, that digital news services can complement traditional paper-based publishing and add – value to the publishers, but the current digital news services are not sophisticated enough for the audience.

Leckner's doctoral dissertation studied the impact of digital media on the newspaper concept, using case studies and eye-tracking experiments. According to Leckner, the impact is two-fold: on one hand, the very strength of the newspaper is that it is generally recognized as the “newspaper concept”. On the other hand, the way that content is presented in a digital medium will also depend on the specific characteristics and technology of the medium. According to her study, digital media offers the newspaper industry an opportunity to differentiate itself in a world where news is becoming increasingly commoditized – however this should be done in a way that further emphasizes the power of the traditional “newspaper concept”.

Both Appelgren and Leckner consider electronic media as a challenge to the traditional paper-based newspaper publishing, but also as an opportunity for differentiation. Newspaper and publishing industries have to adapt, but these changes – which will be gradual and they will take time - do not at all imply the complete end of newspapers and the demand for newsprint.

Korhonen has studied organizational renewal in the North American and European forest industries in a doctoral dissertation (Korhonen, 2006). The study combined internal entrepreneurship and strategic competences to analyze 27 case-studies. The challenge for big companies is how to create the proper balance between efficiency and creativity – companies need to create new customer-based innovations while retaining economies of scale and cost efficiency. The main findings of the case-studies were, that although the application of new technology and knowledge were considered as important as cost efficiency, companies still basically supported only the more conventional, incremental and less risky innovations than more radical innovations. The main reasons for this were found to be lack of resources, lean and centralized organization structures and inward-bound communication.

Korhonen's study highlights the challenges of innovation in the industry and the feasibility of re-inventing the business. Despite the widespread belief that the industry needs to renew itself and innovate, companies still favour a cautious and traditional approach, which may lead to incremental innovations but not necessarily radical ones. This is an important finding.

A number of relevant master of science studies have been conducted during the past ten years. Vaskelainen studied cognitive change in the pulp and paper industry (Vaskelainen, 2006). The study focused on the basic beliefs of the senior managers of

a single Finnish paper company during the tenure of four different CEO's. The main conclusion was, that the basic beliefs of the company were deeply embedded in the culture and changed remarkably little over the relatively long time span of the study. Vaskelainen's study confirms the image of big pulp and paper companies being conservative and traditional in their culture and management thinking. This makes radical change and renewal of the industry more challenging.

The relevant previous research on the topic suffers from the following handicaps:

(1) With the exception of Siitonen's and Korhonen's research and the research on digital media, the focus of all the other above publications is that they are based on a Finnish perspective. Despite extensive searches for similar studies for instance in Sweden or North America, the researcher was unable to find additional and more global studies.

(2) While strategy and competitiveness issues have been covered in all of the above, actual industry transformation issues have not been studied. The scenario studies described above deal with this issue to a certain extent, when analyzing factors effecting the future of the industry.

(3) Most of the previous studies have been carried out before the industry entered its financial crisis in 2002. The reasons behind and the implications of low profitability of the past 8 years have therefore not been taken into account.

Based on above, it seems there exists a research gap, which this study aims to cover.

2.8 Summary of key theoretical concepts, previous research and research gap

The key theoretical concepts which act as the foundation of this study have been briefly presented in this chapter. A summary of these and their respective meaning and roles in this research is outlined here.

(1) There are many different schools of management strategy. It seems, that there does not exist a generally accepted, universal theory on strategy, but each school – while significantly adding to the body of knowledge – has also significant limitations. Porter's theory on competitive advantage in industries and the value chain is perhaps best applicable to this research. Another valuable and applicable theoretical framework is the configuration school, which deals with change and transformation. Taken together, these two fields of research form the theoretical basis for this study.

(2) Another important concept is the product life cycle curve and its implications for commoditization and innovation. According to the theory, once a product has been commoditized its business becomes mainly a cost game, with customers in a very

strong bargaining position. Breaking away from this position requires either the development of an entirely new product or radically reengineering the existing business. It is clear, that both are very difficult and time-consuming.

Furthermore, process industry has certain characteristics in the new product development process such as industrial-scale piloting, which make this even more time consuming and difficult than many other industries.

(3) The concept of industry consolidation does not seem to be a separate branch of management theory, but it is included in different industry and marketing –related studies. According to these, fragmented industries - which are ripe for further consolidation - have certain characteristics such as low entry or high exit barriers, high customer negotiating power, government regulation or limited access to capital.

These factors tend to favour larger companies and therefore act as drivers towards consolidation. Consolidation may bring significant benefits, provided that either economies of scale or higher prices can be achieved – these conditions are not always met and higher market share as a result of consolidation does not automatically lead to higher profitability.

(4) Globalization and internationalization theories present alternate views on different phases from exporting to a globally operating multinational. They also have different strategic, structural and managerial implications for companies aspiring to “go global”. Typically, the evolution takes many years. The opportunities and challenges of the emerging markets have been a focus of much of the recent management research. They each pose a different set of risks and rewards and companies must adapt their strategies and approaches accordingly. The majority of Western companies enter these markets because of the high market growth, instead of just shifting production to low cost countries.

(5) Existing relevant research in the form of published articles, conference presentations and post-graduate dissertations was found to be surprisingly scarce. The most relevant studies by Rohweder, Haarla, Pohjakallio and Siitonen each dealt with a relatively narrow part of the scope of this research. More recent scenario planning studies and the historical context in the case of the Finnish paper industry were also found to be useful.

However, it seems that in terms of studying pulp and paper industry transformation process and strategy there currently exists a research gap. Paper industry value chain and the profitability of its different participants has not been published before. Turnaround management in the pulp and paper industry and the role of the emerging markets have not been studied previously. Similarly, a comprehensive and global

research including industry suppliers and customers regarding the future and critical success factors of the industry has not been published before.

More importantly, no new post-graduate studies or similar has been published after the industry entered its financial crisis in 2003, with the exception of Korhonen's study on organizational renewal.

The following chapters deal with the application of the above theories to the pulp and paper industry and the research questions.

3 KEY GLOBAL TRENDS IN THE PULP AND PAPER INDUSTRY

Some of the most important global trends such as role of the emerging markets, substitution of some paper grades by electronic media, industry consolidation, cost efficiency programs and new product development are presented here. Each one of these would merit extensive and in-depth research – however, this would be beyond the scope of this study. The above issues are discussed only to the extent that they are relevant to the research problems of this study.

3.1 Key characteristics of pulp and paper industry

Some of the key features of the industry are briefly reviewed in the following. Other issues such as consolidation, electronic media and environmental factors are covered separately more in-depth in the sections after this.

(1) Pulp, paper and packaging boards are typically intermediate products. Only tissue and office papers can be characterized as end-user products – after paper production they are not any more converted further but distributed via various channels to the consumer. The products are used by billions of consumers every day – newspapers, milk cartons, cigarette packages, magazines, hygiene products, envelopes, office papers, sacks, pharmaceutical and food packaging etc – to name but a few of the most important ones.

(2) Pulp and paper is a highly diversified industry also product-wise: raw materials, product qualities, distribution and end-uses vary from one product group to the other. For instance tissue, kraftliner and LWC have very little in common, apart from the basic production process and its unit operations.

(3) Capital intensiveness. Pulp and paper ranks as one of the most capital intensive industries – at the same level as oil, chemicals and mining industries. This has significant implications as far as investments, planning horizons and the importance of capacity utilization are concerned. Most big investments have to be considered at least for a 20 year time horizon – a greenfield paper mill today has an investment requirement of ca 400-500 M EUR, whereas a greenfield pulp mill requires ca 1 billion EUR.

High capital intensity has also other implications. Additions of new capacity tend to be big, and this often results in surges of overcapacity. Commercialization of new products takes longer, because of the needs for industrial-scale piloting. Maximizing the returns on the big investments requires the optimal use of the large plants, which often leads to inflexibility in terms of quality, product range and customer wishes.

Large scale production facilities often have to be located in remote areas and away from the main population centers for environmental and other reasons.

(4) Cyclical nature is another feature of the industry. Until 2000, paper demand followed global GDP growth and normal economic cycles relatively well. Due to capital intensity, new capacity in the form of biggest and most modern mills is added at the same time, resulting in substantial overcapacity which then takes time to be absorbed by the market. Paper industry has typically followed a 5-7 year business cycle.

(5) Seasonality is another feature of most pulp and paper products. Typically, the summer months have lower demand for most pulp and paper products and during autumn demand increases and reaches a peak as the year-end approaches. Some products such as tissue are more stable in terms of seasonality.

(6) Regional nature of the industry is another important characteristic. There is relatively little trade between the main producing areas: North America, Europe, South America and Asia. There are several reasons for this – high service level demanded by local customers, additional logistics costs involved and the big home markets are some of these. Therefore, inter-regional trade tends to be highly dependent on currency fluctuations, which often create a short-term cost advantage for a particular region and thus makes exports more attractive.

(7) Ease of technology and knowhow transfer. Due to the fact, that pulp and paper companies have to a large extent outsourced R & D and technology development to their chemicals and machinery suppliers, the industry often does not have proprietary patents and intellectual property rights to new technology. Therefore, chemical and machinery suppliers have been able to sell new technology and training to industry newcomers, especially in China. The problem is exacerbated by the fact, that due to recent restructuring in North America and Europe, many very capable paper industry professionals have been available for new opportunities in the emerging markets – thereby further bridging the gap in knowhow.

(8) Another feature of the pulp and paper industry during the past 8-9 years is the extended downturn of many paper and board products especially in Western Europe and North America. Demand for some traditionally important products such as newsprint have been declining especially in North America.

3.2 Overview of the main production regions and markets

From the global perspective, pulp and paper industry is in very different development phases in the main production areas: North America, Europe, Russia, China, India and South America. As has been previously stated, studying other production areas

such as Middle-East and Africa is beyond the scope of this study – the above regions account for over 90 % of world’s production and consumption of pulp and paper.

Figure 11 summarizes the key issues in each region.

Globally the industry is in different development phases



Figure 11: Phases of development of different production regions (Ernst & Young 2009)

In more detail, the main characteristics of each region are outlined in the following:

(1) North America is still the world’s biggest production and consumption region, with total paper production of 100 million tons. However, it can today be best

described as a maturing and restructuring market, with demand in many grades experiencing very little or negative growth (such as newsprint). This has resulted in a severe restructuring process, with capacity closures, minimum investments, redundancies and some companies forced to apply for chapter 11 protection from their creditors.

(2) Europe is following the same trend as North America, albeit at a somewhat slower and less severe pace. It can also be characterized as a mature and restructuring market – however, what makes Europe and especially Nordic countries somewhat different to North America is the unique forest industry cluster that – according to the industry itself – gives it a technological leadership.

(3) Russia possesses the largest coniferous forest resources in the world and its own market is significant and growing in most paper grades. The challenges that the Russian industry faces are related to poor infrastructure (logistics, forest roads), still ambiguous forest ownership legislation and security of wood supplies and the aging production capacity which needs major investments. The Russian forest industry association Bumprom has estimated, that the industry needs at least 10 billion EUR investments during the next 10 years in order to modernize its capacity.

(4) China's paper industry capacity has grown dramatically over the last 10 years – mainly through greenfield investments driven by rapidly growing domestic demand. Due to the investments, some of the world's most modern paper machines are in China, but the majority of the country's capacity is still based on small and old machinery.

Many multinationals have also tried to establish a presence in China, but so far the market is dominated by domestic companies. The limiting factor of China's industry growth is availability of fiber supplies – most of the capacity is based on imported wood logs, chips, market pulp and recycled fiber. Despite this, China is forecasted to become the world's biggest producer by 2020.

(5) India is often considered as the “next China” due to its high economic growth of recent years. The market has a big potential, but so far very few companies have made significant investments in India. The domestic production capacity is mostly outdated. In addition to shortage of fiber, an additional limiting factor in India is availability of freshwater supplies needed in paper production.

(6) Brazil and certain other South American countries such as Uruguay and Chile have abundant hardwood supplies based on eucalyptus plantations. Chile has both softwood and hardwood fiber and it is a major producer of both softwood and hardwood pulp. Several new pulp lines have recently been built especially in Brazil, which is also a significant paper and board producer. Due to the rapid growth of

eucalyptus, the wood costs are a fraction of those in North America and Europe and therefore pulp production is very cost competitive in Brazil. Brazil and some other South American countries are increasingly investing in pulp production, and it seems likely that they will become the dominant hardwood pulp suppliers in the world.

(7) Japan and Korea also are big paper and board producers. Both countries have large domestic markets and they have mostly focused on serving the domestic market, apart from some investments in China. Both of them share the shortage of fiber, as China does.

The differences between the main producing regions and especially the rapid growth of China and South America combined with the low market growth and restructuring in North America and Europe form one of the cornerstones for the industry's global transformation. How individual companies are able to adapt to this and exploit the opportunities and avoid the threats created by this shift, is one of the key factors for their long-term strategy and profitability.

3.3 Market growth

The markets and their growth for pulp and paper vary according to grade and region. For the purposes of this study, it is not necessary to provide a detailed market study of all the different pulp and paper grades per region – such as the market growth of sack kraft papers in India. Furthermore, the researcher does not have access to the market research databanks of consultancies such as RISI and Pöyry. Therefore, only the main trends and growth of some of the most important grades are presented here.

The global consumption of paper and board is forecasted to grow from the current ca 420 million tons to 560 million tons by 2020 (RISI, 2008). This represents a significant growth – over 33 % or ca 3 % per annum. The forecast is shown in Figure 12.

Most paper and board products suffer from persistent overcapacity especially in North America and Europe. An overview of the capacity situation in Western Europe in 2010 is presented in Table 4 – operating rates indicate the level of overcapacity.

Table 4: Overcapacity situation of main paper and board grades in Western Europe in 2010 (RISI, 2010)

Grade	Capacity (million tons)	Operating rates (%)
Newsprint	9,0	89
Uncoated mechanical reels	7,2	85
Coated mechanical reels	9,5	85
Woodfree uncoated	9,0	86
Woodfree coated	8,2	87
Cartonboard	6,8	91
Containerboard	21,2	90
Tissue	6,5	89

As can be seen from Table 4, overcapacity is significant especially in printing and writing papers. According to above estimates for 2010, ca 10 – 15 % overcapacity plagues most paper and board grades, and the situation in 2010 is actually an improvement from previous years. 2009 was an exceptionally difficult year as a result of the financial crisis, but throughout the last 6-7 years, overcapacity has been a serious problem for the European pulp and paper industry.

Because of the capital intensity of the industry and the resultant surge in new production due to the big investment requirements, overcapacity in most paper grades has always been a problem, until market growth has balanced the situation. Companies were in the past able to export excess capacity to overseas markets, but due to growth in emerging market capacity – especially China – this has become much more difficult. Overcapacity in most paper and board grades in Europe and North America has now been persisting for many years and market growth has significantly slowed down. Detailed and up to date data from other markets than Europe was unfortunately not available to the researcher.

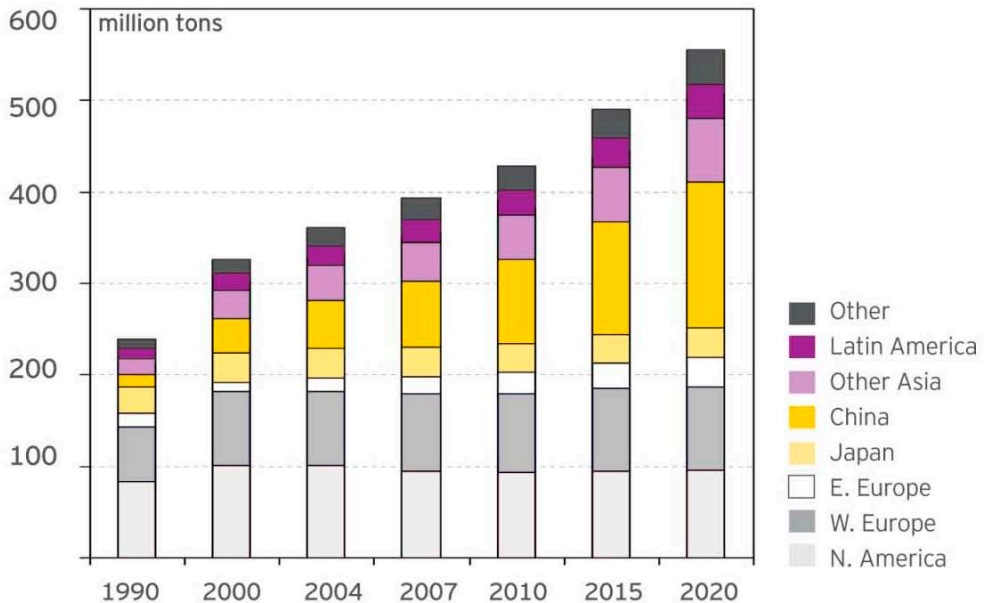


Figure 12: Forecasted regional growth of paper and board up to 2020 (RISI 2008).

As can be seen from Figure 12, according to the above forecast China will take the lion's share of global consumption growth and it will become the biggest market for paper and board by 2020. Western Europe and North America are expected to remain virtually stagnant or even decline slightly, while Eastern Europe and Asia Far East also grow significantly. It should be noted, that Figure 12 includes only the consumption of paper and board – however, as they represent by far the biggest end-uses of different pulp grades, Figure 12 is relevant also to the regional consumption of pulp. The global growth of consumption remains relatively healthy, but there are fundamental differences how the consumption is distributed between various regions.

Newsprint continues its decline in North America and Europe, while in other regions it is still forecasted to grow. Also other printing and writing grades such LWC and

coated woodfree are experiencing zero or declining growth in the Western markets, whereas packaging boards and tissue continue to grow.

It must be noted, that market forecasting in the paper business is not an exact science, and there are risks to the above scenario of relatively healthy global growth. Much depends on the economic development of China, possibly faster than predicted growth of the electronic media and possible new technology development that might substitute paper products faster than forecasted.

3.4 Price development

Real-term prices of most products (for instance, consumer electronics) tend to decline in the long –term, and pulp and paper is definitely no exception. There are many reasons for the declining prices, but the most significant ones have to do with the commoditization of the product and the overall supply and demand situation.

These factors are further analyzed in the following:

- (1) Overall demand and supply situation in North America and Europe. Estimated overcapacity varies between grades, but it is 10-15 % in most major paper and board grades in Europe, as shown in Table 4.
- (2) Currency fluctuations – especially the very weak US dollar against Canadian dollar and the Euro. This means, that overseas markets such as Asia, Middle –East and Africa where trade is based on the US dollar, are highly unprofitable for instance to the European producers. Selling excess capacity to these markets is no longer economically viable and this has contributed to overcapacity in the domestic market.
- (3) Recent charges of price cartels by the competition authorities have also – according to some estimates – made the industry wary of being seen to collaborate in price increases. This has most likely made it more difficult to implement significant price increases despite rising costs.

Constantly declining prices combined with rising costs obviously has a major impact on industry profitability. Figures 16 and 17 show the price development of the main paper and board grades in Europe and North America.

Pulp and paper industry has traditionally followed cost –plus pricing – any increases in costs have been attempted to pass on to the customers. For instance, pulp price increases are still a major argument in price negotiations especially in fine papers.

However, this has during the recent years changed – due to overcapacity customers have the stronger bargaining power and they no longer easily accept price increases based on production costs.

This has resulted in declining profitability for the industry. If the product has certain unique features – such as some speciality papers – more sophisticated pricing approaches based on added – value to the customer etc can be used. However, most of the paper and board products are commodities and relatively easily interchangeable.

3.5 Cost efficiency and restructuring

Because pulp, paper and board are mostly commodity products – with a few exceptions, most notably certain speciality grades – cost efficiency is of paramount importance. Its significance has varied somewhat between different products – for instance, in pulp it has been extremely important while in some of the more value-added products such as liquid packaging boards or double coated woodfree papers quality properties and service levels have been equally or more important. It seems now, that cost efficiency has become the most important competitive factor for nearly all pulp and paper products.

One of the main techniques for reduced costs and improved productivity has been economies of scale. Production output has increased through investments in wider and faster paper machines and debottlenecking of existing machinery.

However, these measures have proved to be inadequate to improve profitability. As a result of the deteriorating profitability for many years now, most big paper companies in North America and Europe have launched major cost reduction or profit improvement programs. Some examples of this are International Paper, Stora Enso, UPM, SCA, Norske Skog and Metsäliitto (Company annual reports, 2003-2008). The focus in most of these programs has been closing down of uncompetitive mills, divestments of non-core assets, minimized investments and reductions of all fixed costs.

The results can be seen in the number of companies, mills, paper machines and employees in Europe (Table 5) in the CEPI area (source: CEPI Key statistics 2008), which includes 27 European countries:

Table 5: Key data on European pulp and paper industry (CEPI 2008)

	2000	2008	% Change
Number of companies	937	756	- 19.3
Number of pulp mills	235	193	- 17.9
Number of paper mills	1 089	887	- 18.5
Number of paper machines	1 877	1 552	- 17.3
Employment	300 400	243 000	- 19.0
Paper production ('000 tons)	92 045	99 002	7.6
Turnover (M EUR)	80 755	78 308	- 3.0

As can be seen, productivity as measured either by production per employee or turnover / employee has improved significantly between 2000 – 2009. Unfortunately, similar data was not available from AFPA (American Forest Products Association), but other public data such as articles in the trade press indicate the development has been similar or more severe in North America.

However, there are limits as to what can be achieved through cost reductions, as is outlined in Table 6 – the approximate cost structure of a non-integrated WFC sheets producer in the Nordic countries (2007 cost levels, delivered to Central Europe):

Table 6: Approximate cost structure of coated fine paper production in Nordic countries (Ernst & Young 2007)

Cost factor	Cost EUR/ton
Fiber	230
Chemicals & pigments	120
Energy	70
Personnel	120
Maintenance materials	90
Delivery	110
Financing	70
Total	810

The above example represents a mill perhaps at the lower end of competitiveness – there are more efficient, bigger and integrated producers of fine paper and other grades in the Nordic region. But the scale of individual cost factors is similar: wood, fiber, chemicals and energy costs account for 60-70 % of the total costs, and these are

commodities purchased at global market prices. Skillful production management can reduce breaks and improve efficiency to a certain extent, but only personnel and certain other smaller costs are directly under the control of management.

There are of course regional variations and differences between products in cost competitiveness. These are due to different unit costs, production technology and efficiency. A list of main unit costs such as wood, recycled fiber, chemicals, coal and wages and salaries between Finland, Sweden, Germany, Canada (BC), Brazil, Russia, India and China is included in the Appendix. These regional differences are discussed more in detail in chapter 8 dealing with the role of emerging markets.

3.6 Fiber sourcing

Fiber sourcing – whether wood or recycled - is another major issue, that has become increasingly critical for many production regions. Three or four years ago this did not seem like a critical issue for the industry. However, that has now clearly changed and some of the reasons for this are listed below:

- (1) Growth of China's production and shortage of fiber supplies in China.
- (2) Threat of using wood directly for energy generation in Central Europe.
- (3) Competition of available land between plantation forests and food production.
- (4) Protectionist measures of some countries – most notably Russia – in imposing export tariffs for wood exports.
- (5) Increasing activity and demands of environmental non-governmental organizations for preserving forests – both in Northern Hemisphere as well as the tropics.

Fiber cost and availability has therefore become a limiting factor for the growth of many pulp and paper companies for instance in China and India. Currently China imports most of its fiber – virgin fiber from South East Asia and recycled fiber from California and Central Europe.

Competition for fast-growth eucalyptus and acacia plantations has clearly intensified, and many companies are scouting also quite exotic regions such as Papua New Guinea and Sub-Saharan Africa for available plantation lands. Eventually this will most likely place a constraint for expansion of hardwood pulp production.

It has recently been speculated in the media, that the new pulp mills being built in South America and other regions based on extremely cost competitive plantation wood spells the end of NBSK pulp production in the Northern Hemisphere. This is not the case – hardwood pulp can only be used in certain paper grades and there will continue to be demand for long fiber NBSK pulp.

3.7 The impact of electronic media

Paper and packaging have for many years competed with substituting products in the form of plastics and glass for packaging and other media (television, radio, movies, outdoor) for publishing and commercial printing. During the 1990's, the advent of the internet created a new competing media - electronic media and advertising.

Basically this refers to different on-line news publications, digital books, advertising and on-line services for travel and auctions etc. Digital books are only now entering the market – the other forms of digital media have been growing already for several years. This trend is a major concern for especially the producers of printing and writing papers – newsprint, coated and uncoated mechanical papers and woodfree papers.

Digital advertising has grown rapidly, and its share of global advertising revenue is forecasted to grow to 13 % by 2012 (Zenith Optimedia, 2009). It is forecasted to grow more rapidly than traditional printed or television advertising – however, as also the total advertising expenditure has continued to grow, it has so far not been perceived as a potentially fatal threat. Due to the current decline in total advertising expenditure as a result of the financial crisis and the continued growth of digital advertising – despite the crisis – it has gained much more attention.

On-line newspapers – which are mostly free – have presented a serious challenge to publishing overall. Classified ads – such as advertising for used cars or apartments for sale – have been a significant source of revenue for newspapers, and these have now to a large extent shifted to the internet, especially in the United States. Additionally, the on-line and free versions that most of the world's well-known newspapers such as The New York Times and Financial Times have been forced to offer, have reduced the subscriptions for the print versions of the publications. As a result, newspaper publishing in the United States has for some years now been in serious difficulties and some prestigious newspapers have gone bankrupt.

Obviously, this means that as paginations go down and publishers are in financial trouble, newsprint producers are also in difficulties. The newsprint consumption in the United States has declined significantly during the past few years and the trend is expected to continue.

Publishers are fighting this trend by no longer offering their on-line versions for free and limiting the content available on-line – the idea being that only quick news-flashes etc would in the future be available on-line and serious commentary and analysis would only be available in the printed publication.

Recent studies (for instance, Hill-Wood, Wellington, Rossi, 2009) however, indicate that only a small fraction of the younger “on-line generation” – between 15 – 30 years of age – any more read newspapers, and in the future printed newspapers would only be read by the older, more affluent “elite”.

There are similar results in other countries, but the trend in the United States is not necessarily replicated in other countries – this depends on the level of internet saturation, demographics, newspaper distribution systems etc. Newspapers and newsprint demand continues to grow healthily in many developing countries, as a result of increasing literacy rates and rising incomes.

Certain other issues regarding the electronic media need to be considered:

(1) While on-line advertising has grown rapidly, it has also created an entirely new advertising media – thereby most likely expanding the total advertising spending.

(2) As a media, it is not very suitable for more “sophisticated” advertising such as television commercials.

(3) According to studies, most internet users find on-line ads irritating, comparable to junk mail.

(4) The impact on paper products varies between different grades. It has already had a big impact on newsprint in North America, but other printing and writing paper grades are not likely to be as severely effected.

(5) The rapid growth of the mobile internet and accessing the net via mobile devices and portable, small laptops instead of from for instance a home personal computer is a trend that most likely actually supports print-media. Hand-held devices and small laptops with their small screens do not easily enable an enjoyable visual or a reading experience, and combining advertising with content makes this even more awkward.

These devices support the trend that especially younger people go on-line to search for something specific – information about weather, downloading music, classified ads etc - and the more thorough and extensive analysis of news or topics of interest are acquired via print or other media.

Therefore, it is likely that a form of “hybrid” media will emerge, combining the best of both digital media and the traditional media with an eventual balance between the two. For instance, consumers might prefer to select furniture from a printed catalogue and order and pay for it on-line.

Despite the still relatively low market share of digital media of the global advertising expenditure, it must be noted that it is still in its early phases of development. Internet overall already very effectively competes with other media for the leisure time of consumers. It certainly is a trend that paper industry needs to be very concerned about.

3.8 R & D and technology

A thorough analysis of the above topic would need several studies similar to this one and it is therefore out of scope. Only a brief summary of the most important technology trends and R & D activity of the pulp and industry is presented and to the extent they are relevant to the research questions - what role do they play in industry transformation?

Papermaking has a long history. The invention of paper is attributed to Tsai Lun in 105 AD in China, and it is claimed that the basic process for producing paper was invented already then: forming the fiber network, pressing and drying it to produce a flat, even surface to be used for writing, painting, drawing and other purposes. The Chinese consider paper therefore a Chinese invention, and perhaps due to this reason the Chinese government supports the industry actively. Since then paper has been hand-made from various different fibers, such as papyrus, textiles etc.

Industrial – scale production began in the late 19th century, and perhaps the first important industrial papermaking invention was the fourdrinier – wire, which is still in use in thousands of paper machines. Thereafter many other innovations have taken place – in pulping, calendering, coating etc. The last major technological innovations were most likely the blade-coating and kraft pulping technologies, which begun to be more widely in use in the 1960's.

In more recent years, the pace of radical, breakthrough innovations in papermaking and pulping has slowed down. There have been many incremental innovations both in the processes and products, but it is doubtful whether they qualify as breakthrough, radical innovations.

A radical innovation typically displaces the older technology in time – this has not happened and the basic unit operations and paper qualities have remained more or less the same and are still in use since the 1960's. An example of a radical innovation is the mobile telephone displacing the traditional telephone.

Some of the recent, significant – but still more incremental rather than radical – innovations developed between 1950 and 2000 are listed in the following (not in any particular order of importance):

- (1) LWC - in the United States during 1950's.
- (2) Different wet end structures, such as the twin-wire former and dilution headbox.
- (3) Liquid packaging boards.
- (4) TCF: Chlorine – free bleaching – in mid 1990's.
- (5) Shoe press technology – in 1980's, but applied to high speed papermaking in late 1990's.

- (6) New mechanical pulps, such as BCTMP – 1980's, PGW and TMP in the 70's
- (7) Crown controlled roll - enabling wider paper machines
- (8) New coating technologies, such as curtain, film and SDTA (Short Dwell Time Application) coating,
- (9) Medium consistency technology in the 1980's.
- (10) Condebelt and impulse drying.
- (11) POM technology for the wet end short cycle.
- (12) Deinking technology and paper grades based on deinked pulp 1980's.

At the same time, significant advances have been made in odour control of the pulping process, chemicals and additives, effluent treatment, finishing equipment, process control and automation. Product quality has improved, and basis weights of many grades such as LWC have decreased resulting in more printing surface per ton. New concepts that reduce the capital requirement and decrease production costs are being developed by the leading machinery suppliers.

All of the above innovations are very significant and they have improved the product qualities and made the production processes more efficient and environmentally friendly. But based on the announcements of different companies and numerous articles in the trade press, the industry needs also radical innovations in addition to current incremental innovations. The above innovations have not led to a sustained and improved profitability except for a certain period of time and the financial figures of most paper companies between 2003 and 2009 testify to that.

As has been shown in chapter 2 (theories on product life cycle and innovation), pulp and paper products are mostly in the mature or decline phase of their life cycle. An adaptation of the model is shown in Figure 13.

The abbreviations used in Figure 13 are the following:

- FBB: Folding Boxboard
- WLC: White-Lined chipboard
- LPB: Liquid-packaging Board
- LWC: Light-weight Coated paper
- WFC: Woodfree Coated
- WFU: Woodfree Uncoated
- BHKP: Bleached Hardwood Kraft Pulp
- NBSK: Northern Bleached Softwood Kraft Pulp
- KLB: Kraftliner Brown
- TLB: Testliner Brown

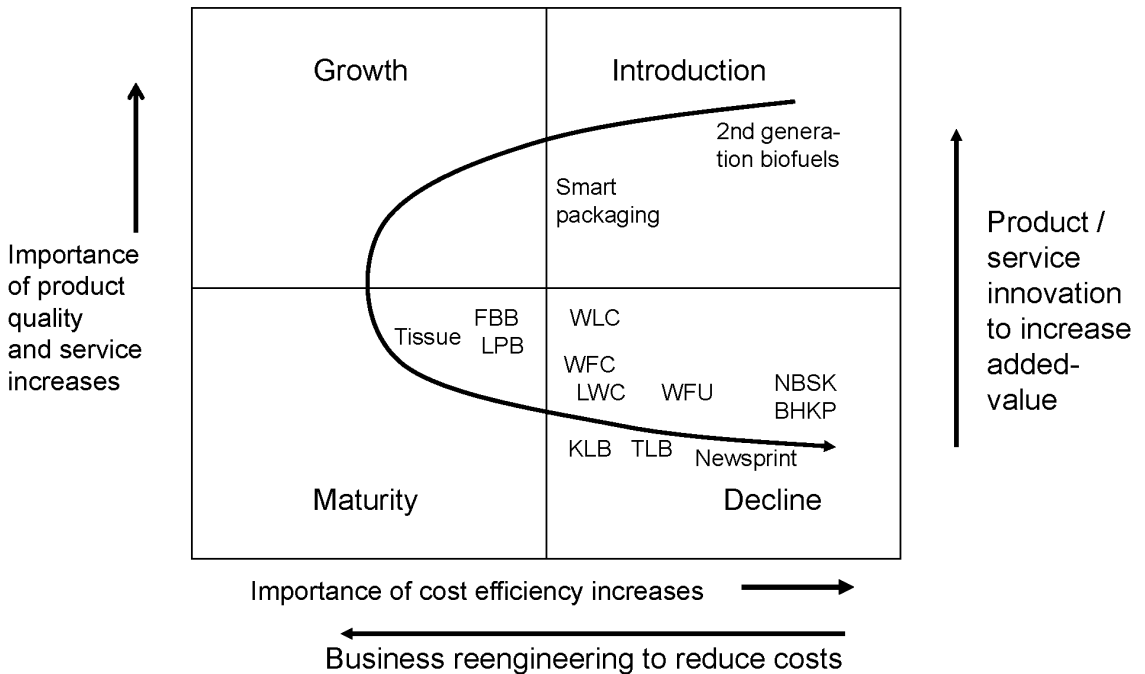


Figure 13: Commoditization degree of various pulp and paper grades

Some explanatory comments on Figure 13 are necessary:

(1) The position of each product group on the curve is approximate and mainly based on market growth in North America and Europe. Products in the lower right hand – or decline – quadrant have a lower market growth than average GDP % of 3.0 %. One can debate the relative position of each product compared to other products – however, the most important issue is in which quadrant each product is placed.

(2) Products that are in decline phase have the most serious renewal and innovation challenges. The ways to reposition the product are either business innovation leading to significantly lower cost structure or a radically new product or service innovation.

A good example of this is brown kraftliner and brown testliner, which are still produced in big quantities but they are gradually being replaced by white top and coated liners - a process that has been underway since 1990's.

The conclusions that can be drawn from the analysis are the following:

(1) Most of the pulp and paper products are either in the mature or the decline phases.

(2) Repositioning – either in the reengineering direction or product/service innovation direction is very difficult and inevitably takes time. The case of brown kraftliners being replaced by white top liners has been underway for many years.

(3) It seems, that there are currently very few promising new products in the introductory phase – at least any that have so far been published. 2nd generation biofuels are currently being actively developed by many pulp and paper companies jointly with big oil companies, but the first pilot plants will be ready for production earliest in 2014-2015. Nanofibers is another promising development area. However, both biofuels and nanofibers are intermediate products - oil companies and specialty materials companies control further processing and distribution to consumers.

(4) As can also be seen from Figure 13, pulp and paper is a fragmented industry comprising of several different sub-businesses. Any significant or radical innovation developed in for instance tissue is unlikely to be very significant to other businesses such as newsprint – unless the innovation concerns factors common to all paper products, namely some common raw materials and production process. This adds to the challenges of radical innovation across the entire pulp and paper industry sector.

During the last 3-4 years pulp and paper industry in North America and Europe has responded to the declining profits, maturity of the markets and criticisms in the media by intensifying its R & D efforts. European-wide and national research programs have been established and R & D receives more funding and top management attention than previously. The forest industry cluster is intensifying its internal R & D cooperation as well as cooperation with other industries such as biotechnology and telecommunications.

There are numerous new technologies being developed, some of which are smart packaging boards, biofuels and applications of nanotechnology. But based on above analysis, the bulk of the industry turnover will continue to be generated by the current products for many years– improving their competitive position through business reengineering or product innovation will continue to be vital for the long-term competitiveness of the industry.

3.9 Environmental issues

Environmental issues have played and continue to play a major role in the development of pulp and paper industry. The topic is extremely wide, and therefore only the aspects that are relevant to the research questions are presented here.

Over the past 20 years, the following issues have perhaps been the most important for the industry in North America and Europe and received public attention:

- (1) Chlorine – free bleaching in early 90’s.
- (2) Recycling and increase of the paper recovery rate in the 80’s.
- (3) Environmental audit certificates – late 90’s.
- (4) Debate on forest certificates – FSC, others.
- (5) Protection of certain rare species, such as the white spotted owl in the Pacific Northwest.

During the 1980’s the focus was mostly on effluent and air pollution reduction – as the industry has drastically reduced its emissions and effluents, these issues no longer seem to generate public attention.

The current themes for the industry seem to be the following:

- (1) Illegal logging in tropical forests.
- (2) Reduction of pollution caused by transports.
- (3) Preservation of biodiversification .

The importance of these issues obviously varies between regions. But it certainly seems, that the “hard” environmental concerns such as polluting the rivers or air emissions have been replaced with “softer “ environmental issues.

The current main environmental theme throughout all industries and regions is climate change. This will obviously have a major impact also on pulp and paper industry, but there is so far very limited research on its impact.

3.10 Summary of key global trends

Some of the most important characteristics and global trends have been discussed in this chapter. Many of these issues are very wide topics, so the focus has been on reviewing these issues only as far as they have implications or relevance to the research questions.

The main conclusions from this chapter are the following:

(1) The global production landscape is shifting, with China forecasted to become the biggest paper and board producer in the world by 2020. Also South America, Russia and Central Eastern Europe will grow and the capacity in North America and Western Europe will remain at the current level. Globally, the market for pulp and paper will grow by close to 30 % during the next 10 years (RISI 2008).

(2) Real-term prices for the main paper and board grades have declined significantly and this trend is likely to continue in the long-term.

(3) Intense restructuring and cost efficiency programs have been underway in North America already some years now and Western Europe is following the same trend. However, there are clear limits to cost reductions and 60-70 % of costs are based on variable costs, which are based on global market prices.

(4) Fiber sourcing is becoming a limiting factor to many producers, especially in China. Availability of plantation lands will eventually place a lid on the growth of eucalyptus and acacia plantations for hardwood pulp production in the Southern Hemisphere.

(5) Although paper and board have competed against substituting products such as plastics and television advertising for many years, a significant threat to printing and writing papers (especially newsprint) has evolved from digital media. Digital advertising – although still relatively small – is growing rapidly. However, there are mitigating factors as to its impact and a possible future scenario is one of a hybrid media with a balance between printed and digital media.

(6) Nearly all the main paper and board grades are in a mature or a declining phase of their product life-cycles. Repositioning the products either through cost reengineering or product development will be very difficult and time-consuming. The industry is now actively developing new products and new forms of research collaboration.

Despite some new promising products and technologies such as smart packaging and biofuels, the industry will have to improve and maintain the competitiveness of its existing product portfolio for many years to come.

(7) The focus of environmental debate and issues has shifted from the “hard” issues like effluent treatment and air emissions to the “soft” issues such as forest certification and illegal logging. This is mainly due to the significant investments and improvements the industry has made in North America and Europe in terms of reducing its environmental impact. However, the biggest global concern – climate change – and what are its impacts on the pulp and paper industry – is yet to be

determined. At the moment carbon trading costs are unevenly distributed between the main production regions.

Consolidation, cost efficiency programs and the role of emerging markets will be analyzed in detail in the following chapters. The theoretical building blocks and key global trends are now in place for their in-depth application to the research questions.

4 INDUSTRY PROFITABILITY

As has been mentioned before, pulp and paper industry profitability has been unsatisfactory for many years now – since 2001. For the purposes of this study and other research at Ernst & Young, key financial data from 2003 to 2008 of 54 companies that participate in the paper value chain was collected. This consists of market pulp, chemicals, machinery suppliers, paper and board producers, printers, merchants, publishers and consumer goods companies. The results are presented in Appendix 4.

4.1 Methodology

The selection criteria of the sample of companies to be analyzed were the following:

- (1) They play a major role in the paper value chain – either as a supplier of important chemicals or equipment, as one of the biggest paper and board producers or as buyers of paper and board.
- (2) The companies must be publicly traded companies and all the information has to be based on public information.
- (3) The sample must be geographically as neutral as possible and therefore include companies from North America, Europe, South America and Asia to the extent possible.
- (4) The sample of pulp and paper companies must be as evenly distributed between different products as possible and cover all major product groups.
- (5) The sample must be big enough to ensure that results and conclusions are valid and reliable.

The key figures collected were defined to be the following:

- (1) Turnover in US dollars
- (2) Earnings before interest and taxes including non-recurring items (EBIT) in US dollars and as percentage of turnover.

There are a number of constraints on the methodology used. These are discussed in the following:

(1) Few of the companies – mostly the biggest chemicals suppliers – do not publish the financial results of their sales to pulp and paper industry. The segment is not big enough for them to form a division of its own. A number of chemicals suppliers such as Kemira, Akzo-Nobel, Imerys and Hercules, however do publish also the pulp and paper segment results at sales and EBIT –level. This has to be considered when interpreting the results.

(2) Some of the biggest pulp and paper companies are privately owned and do not publish their results. The most notable examples are Georgia-Pacific and Asia Pulp & Paper. Many of the medium-size or smaller Chinese companies are also private or state-owned and they do not publish their financial results.

(3) Differences between the accounting practices of different countries with regard to depreciation poses a problem. The European companies figures are based on IFRS (International Financial Reporting Standard), whereas the North American companies are only now in the process of migrating from their own accounting standards to IFRS. Brazil and China are also in the process of implementing IFRS. This represents a problem – metrics such as EBITDA which does not include depreciation are no longer presented in the annual reports of most companies and there is insufficient disclosure in the notes to the financial statements to calculate EBITDA. Furthermore, EBITDA as a sufficient tool for analyzing profitability is questionable. Other metrics such as profit before taxes etc have the same limitation of EBIT.

However, depreciation is only one component of EBIT and the differences between the accounting practices are not major. Most of the analyzed companies have adopted IFRS, and they are comparable with each other. Furthermore, the purpose of the analysis is not to compare the financial performance between two individual companies, but the historical level of profitability between groups of companies. Therefore, while there may be discrepancies in the comparability of the financial performance between some companies across different regions and due to different accounting practices, these are not considered to significantly alter the conclusions.

(4) It can be debated, whether the inclusion of non-recurring items in the EBIT calculation is correct. North American and European pulp and paper companies have been forced to incur major non-recurring items in the form of restructuring costs, write-downs, impairment charges and redundancy costs, while companies in other regions have only to certain extent had to follow suit. If one were to analyze only the operative performance on a year-to-year basis of a single company or group of companies, it would be logical exclude the non-recurring items.

However, most pulp and paper companies have incurred significant non-recurring costs every year during the period under question – it can be argued whether they

actually are non-recurring items any more. More significantly, the non-recurring items are specifically caused by restructuring, redundancies and asset write-downs – all of these reflect the cost of transformation and the research questions. Therefore, it is logical to include the non-recurring items in the EBIT figures.

(5) The geographical spread of the sample is not perfect, but as even as possible. The sample consists of 28 pulp and paper companies, of which 8 are North American, 10 are European, 3 Brazilian, 5 from Asia and 1 from South Africa and Australia. The geographic distribution is based on the industry structure and number of companies of each region, as well as the availability of financial figures.

The PPI Top 100 2007 listing of the biggest 100 pulp and paper companies consists of 32 North American, 34 European, 22 Asian, 8 South American, 2 African and 2 Oceanic companies. Not all of the North American, Asian and South American companies listed in the PPI 100 report their financial results.

The comparison of sample geographic distribution with the PPI listing is presented in Table 7.

Table 7: Comparison of sample geographic distribution with top 100 companies

Region	% of sample	% of PPI Top 100
North America	28,6	32
Europe	35,7	34
Asia	17,9	22
South America	10,7	8
Africa	3,5	2
Oceania	3,5	2

The sample distribution is reasonably well in line with the PPI Top 100 listing, which is included in Appendix 6. European companies are slightly over-represented, whereas Asian companies due to reasons mentioned above are somewhat under-represented.

4.2 Financial results

The full results of all the 59 analyzed companies including all the paper value chain participants is included in the Appendix 4. Table 8 lists only a selection of some of

the biggest pulp and paper companies for the convenience of the reader and as a basis for the discussion of the results.

Table 8: Financial results of selected pulp and paper companies (including non-recurring items)

Company	Turnover 2008 (B USD)	EBIT % 2008	EBIT % average 2003-2008
1.International Paper	24.8	5.6	5.8
2.Kimberly-Clark	19.4	13.1	14.6
3.Stora Enso	15.3	-6.6	1.4
4.SCA	14.1	7.7	7.3
5.Oji Paper	14.0	2.6	3.8
6.UPM-Kymmene	13.2	0.3	3.9
7.Nippon Paper	13.2	1.7	2.5
8. Metsäliitto	8.9	0.0	0.8
Norske Skog	3.8	10.3	2.3
Sappi	5.9	5.4	2.7
MeadWestvaco	6.6	1.2	2.5
Mayr-Melnhof	2.4	7.9	9.4
Holmen	2.5	5.5	12.0
Portucel Soporcel	1.6	16.0	14.6
Aracruz	2.1	15.9	25.6
Votorantim (VCP)	1.4	14.6	24.6
Södra Skogsägarna	2.1	4.5	7.8
Nine Dragons	2.1	16.0	19.5

The above ranking of the top 10 is based on PPI top 100 listing of 2008 (PPI, 2009), which includes figures from paper, board, converting and merchandising only. The PPI listing of top 10 would include also Procter & Gamble, which is excluded from above as it is considered mostly a consumer products company. Georgia-Pacific would also otherwise be in the list – however, it no longer publishes its results. Table 8 includes also a selection of other companies, which are not among the top 10 but which are important players from the European perspective.

The financial results of the top 10 pulp and paper companies have averaged at 4.7 % of earnings before interest and taxes between 2003 and 2008 – six consecutive years of unsatisfactory profitability. The return on capital employed of those companies that report it is also low, averaging 3.5 % - the financial targets that these companies have set themselves is between 12-14 % over the business cycle.

The “other companies” – that do not belong to the top 10 – listed in Table 8 includes smaller pulp and paper companies such as Mayr-Melnhof, Holmen, Portucel – Soporcel, Aracruz and Votorantim that have clearly outperformed their bigger peers.

4.3 Discussion of the financial results

The financial results of the industry seem to leave much room for improvement. Despite the fact that the pulp and paper industry is a cyclical industry, the unsatisfactory results have continued over the last business cycle and during a period of strong global economic growth.

Some other interesting observations are the following:

(1) Some companies – as listed in Table 8 – have been able to clearly outperform their peers. What seems to be common to these companies is, that they are relatively focused – none of these companies have more than two different divisions and some – such as Kimberly –Clark, Mayr-Melnhof, Nine Dragons and Portucel – are focused on only one product group.

(2) Company size does not seem to correlate with profitability very well. The top 10 companies have generated an average EBIT of 4.7 % whereas the smaller ones – with turnover below 4 billion USD – have averaged 7.2 %.

(3) All of the top 10 companies have launched one or several major cost reduction and profit improvement programs during 2003 – 2008. These have not been enough to significantly improve profitability.

One of the research questions of this study was, that “Why is transformation of the pulp and paper industry needed?”. In light of the financial performance of the industry between 2003 and 2009, incremental changes have not been enough to improve industry performance. More radical changes are needed – ie, the industry needs to transform.

5. PAPER INDUSTRY VALUE CHAIN AND ITS PERFORMANCE

As has been presented in the previous chapters 2 and 3, according to Porter's theory 5 forces determine an industry's intensity of competition: rivalry between existing firms, bargaining power of suppliers and customers and the threats of substitution and new entrants. A company's positioning in this arena (cost leadership, differentiation, focus) forms the basis of its competitive advantage, and one tool for analysing this is the value chain. According to theory, companies must make a strategic choice: those that do not, end up being "stuck in the middle" with limited possibilities for success.

Paper and board are intermediate products with a long distribution chain to the ultimate consumer. The chain from forest to end-user involves many production, converting and distribution steps, each of which add both value and costs and most of these are independent, profit unit organizations. The paper chain includes two of the 5 competitive forces, namely the bargaining power of suppliers and customers.

This chapter analyzes the paper value chain and its profitability, with the aim of contributing to answering research questions 3,4 and 6: what role does the entire paper value chain play in industry's transformation process, what are the underlying reasons for unsatisfactory profitability and what are the implications for corporate strategy.

5.1 Methodology

The paper value chain is constructed based on four actual case examples, which are the following:

- (1) Production of an annual report in Finland, using double-coated woodfree sheets.
- (2) Distribution of copier papers in Great Britain.
- (3) Production and sales of a women's magazine in France, using MWC.
- (4) Sale of cigarettes in Germany with folding boxboard as the packaging.

Put very simply, the logic of the analysis is to estimate the price of 1 ton of each of the above products at final point of purchase. For instance, the case of a women's magazine in France is as follows: one copy of – say, Elle or Cosmopolitan – weighs approximately 250 grams. 4000 copies of Elle at the newsstand at the cover price of 4.50 USD would cost the total of 18 000 USD. Starting from the approximate end-user cost the costs of each of preceding production steps were worked out, ending at the average cost of wood.

These cases were calculated by the researcher in 2007 at Ernst & Young, based on data gathered from the participants in the cases described. While this method is not accurate or scientific, it does give a simple and reasonable estimate of the value generated at each step of the chain.

Unfortunately, publishing companies do not disclose the amount of paper they buy to produce a particular magazine. However, for instance Sanoma Corporation (a Finnish media group that publishes newspapers, magazines, learning materials and additionally distributes them and other consumer goods packed in paper and board) in 2009 bought 238 000 tons of paper which via content, printing and distribution generated a turnover of 2,8 billion EUR (Sanoma Oyj annual report 2009). Sanoma is also involved in the entertainment sector through television etc, and this generated a turnover of 157 million EUR in 2009 – when that is deducted the added-value generated by Sanoma is 10 970 EUR/ ton. Considering that prices of newsprint and magazine papers in 2009 averaged 550 EUR / ton and 670 EUR (RISI, 2010) respectively, the paper's share of added-value is ca 5-6 %. This is well in line with the results of the value chain analysis.

5.2 The paper value chain and the results

The results of the four cases are depicted in Figure 14.

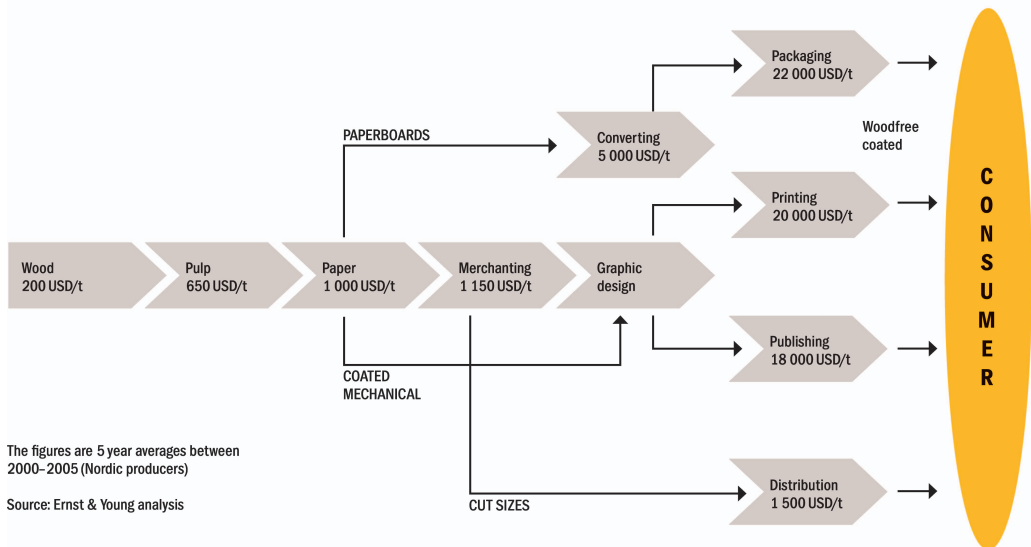


Figure 14: Value creation in the paper value chain

Several conclusions can be drawn from the results:

- (1) At least 5-6 independent, profit unit organizations are involved in production and delivery of the final product to the consumer. They each act as suppliers and customers to the companies preceding and following them.
- (2) The chain is only partially integrated. Pulp, paper and board production can be part of the same organization or the same production mill, but there are very few cases of further vertical integration. The most common further vertical integration consists of some containerboard producers such as SCA and Smurfit Stone producing also the corrugated packaging – even then the integration level is usually not above 50 %, ie only 50 % of containerboard production is converted in own box plants.

There are some similar cases in folding boxboard and carton production, as well as sack kraft paper and sack converting. Some fine paper producers are also involved in paper merchandising, although the trend at least in Europe during past two years has been against this and many companies have exited the paper merchandising business.

Any further integration forward for instance to printing or publishing is not known to the researcher. None of the top 50 paper producers are currently involved in these.

(3) As can be seen, clearly the biggest value is generated at the end of the chain – in publishing and consumer goods production.

(4) Paper and board production generates only a small fraction of the total value creation – ca 5 %.

5.3 The performance of the paper value chain

Based on the financial figures of the participants of the paper value chain (as discussed in chapter 4), the correlation between the financial performance and the role each participant plays in the value chain can be analyzed.

The financial results of the different players in the chain have been grouped into the following:

- (1) Pure market pulp producers
- (2) Pulp and paper chemicals and pigment suppliers
- (3) Paper and pulping machinery suppliers
- (4) Paper and board producers
- (5) Paper and board merchants
- (6) Printers
- (7) Publishers
- (8) Brand-owners.

The corresponding results of each group are presented in Figure 15.

Average EBIT % 2003 – 2008 of value chain participants

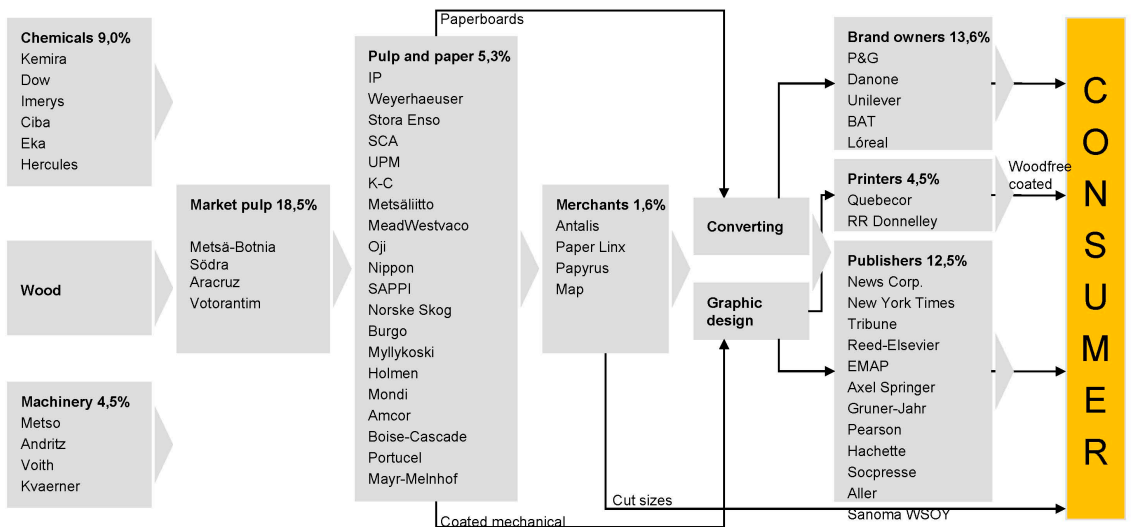


Figure 15: Financial performance of different value chain participants (EBIT %)

Some of the observations from Figure 15 are listed in the following:

- (1) By far the most profitable participants in the chain are the brand-owners and publishers.
- (2) Also the chemicals and machinery suppliers to the paper industry have performed better than the industry – except recently. During the past two years also their profitability has declined.

(3) Market pulp producers – also those in the Nordic region such as Metsä-Botnia and Södra Skogsägarna – have outperformed the paper producers. Compared with the historical average stumpage price of fiber wood (ca 15-20 USD/m³, solid with bark) in the Nordic region and average unit consumption of wood of 5 M³ / ton of NBSK, the trend price of NBSK at 650 USD/ton is relatively high.

(4) Paper and board producers, merchants and printers are at roughly the same level in terms of profitability.

Correlation with the relative value creation in each step of the chain and the profitability of each player group – ie, the relation between the player and the preceding one of the chain vs corresponding EBIT % needs to be analyzed. This is shown in Table 9.

Table 9: Correlation between relative added-value and profitability

	Added value USD / ton	Relative added-value/ton	Average EBIT %
Market pulp (NBSK)	650	3.25	18.5
Paper and board	1 000	1.54	5.3
Merchanting	1 150	1.15	1.6
Commercial printing	20 000	20.00	4.5
Publishing	18 000	3.60	12.5
Consumer goods	22 000	4.40	13.6

According to the analysis, relative added-value does not statistically correlate very well. This is most likely because of commercial printing, which concerned the case of printing an annual report. Unfortunately the sample of companies studied consisted of only two printers – RR Donnelley and Quebecor – who produce a very wide range of various printed products and most likely the printing of an annual report does not represent their business very well. More detailed and comprehensive analysis would be needed regarding the correlation between added-value and profitability in the commercial printing segment. However, when that is removed from the analysis, the other segments correlate quite well, with a correlation coefficient of 0.83.

5.4 Discussion of the results

The following conclusions can be drawn from the analysis:

- (1) Paper and board are intermediate products in a long value chain, and they are able to capture only a small fraction of total value created to the final consumer.
- (2) Vertical integration is relatively limited, applying mainly to pulp and paper & board in some cases. Most of the world's paper and board mills are non-integrated.
- (3) By far the greatest added-value is created at the end of the chain and near the consumer.
- (4) In terms of relative added-value, also market pulp performs well.
- (5) Profitability of the different groups of value chain participants correlated relatively well with their added-value in the chain, with the exception of commercial printing which would require further analysis.

As was mentioned in sections 2.3 and 5.2, there are certain limitations to the analysis and these must be taken into account prior to making any final conclusions. First and foremost, the actual cases concerned only Europe and only four paper and board grades – coated mechanical reels, folding boxboard, woodfree uncoated (cut sizes) and coated woodfree. It is possible – though not very likely – that the value chains of other products (such as newsprint in Europe) or of the above-mentioned grades in Asia or North America would be significantly different. It is unlikely, because the structure and the participants of the value chain are similar – but this has not been verified.

Secondly, although it is based on actual cases, the method used for calculating the actual added-value per each step is an approximation. It is likely, that there are variations in the results of for instance different magazines or brands of cigarettes. However, the margin of error is very small when comparing with the actual gap between added-value of paper and board and the actual consumer product. If a magazine in France has an added-value of 10 000 USD/ton instead of the 18 000 USD/ton used in this analysis and 800 USD/ton is the added-value for paper, the conclusion is still the same.

Thirdly, one may argue that paper and board production and publishing or cigarette production are entirely different businesses and the comparison between them is pointless or unfair. Admittedly, these are different businesses – but the publishers and brand-owners define the product quality and service requirements based on the consumer preferences and therefore they have a fundamental impact on the rest of the value chain. Furthermore, paper and packaging board are very important product attributes and cost factors in their business.

Keeping in mind the above limitations, the following conclusions can be drawn from the results:

(1) The producers of coated mechanical reels, folding boxboard, woodfree uncoated and coated woodfree in Europe are positioned in the middle of the value chain. In terms of vertical integration, they are “stuck in the middle”. It is likely, that the same applies to other main products and regions as well.

(2) Both the beginning and the end of the value chain adds more relative value than paper and board. This correlates with the profitability of each value chain group – the market pulp producers, publishers and brand-owners have been much more profitable than paper and board producers during 2003 – 2008. Also the machinery and chemicals suppliers have on average produced better results than paper and board – however, during 2008 and 2009 also their results have declined.

(3) It seems, that especially the brand-owners and publishers have the advantage of stronger bargaining power than the paper and board suppliers. The very high gap in the profitability between these groups indicates that.

In short, Porter’s theory of competition – the 5 forces defining intensity of rivalry and the need for advantageous positioning and strategic choices – seems valid for the pulp and paper industry.

6. INDUSTRY CONSOLIDATION AND ITS EFFECT ON PROFITABILITY

Pulp and paper industry has been steadily consolidating for many years. As a result of a number of waves of mergers and acquisitions during 1980's and 1990's, the names of many well – known companies have disappeared from the business. Some examples are Champion, KNP-Leykam, Consolidated Paper, MoDo, Metsä-Serla and Fletcher – Challenge. It has been speculated, that ultimately only 5 big, global pulp and paper companies would dominate the market – that is however still far away.

6.1 Current level of consolidation

Despite waves of mergers and acquisitions, the industry still remains fragmented. Table 10 lists the market shares of the PPI Top 100 companies classified according to size in pulp and paper in 2007.

Table 10: Size distribution of top 100 pulp and paper companies (RISI, 2007)

Category	Sales B USD	% Total	Market pulp ('000 tons)	% Total	P & B ('000 tons)	% Total
1-10	121.4	40.1	3321	10.1	73200	34.8
11-20	62.5	20.9	5212	15.8	34800	16.6
21-30	32.9	11.0	2997	9.1	34553	16.4
31-40	22.0	7.3	3391	10.3	19100	9.1
41-50	16.9	5.6	7675	23.3	11730	5.6
51-60	12.6	4.2	3246	9.9	11073	5.3
61-70	10.5	3.5	4194	12.7	8203	3.9
71-80	8.6	2.9	0	0.0	5256	2.5
81-90	6.8	2.3	1425	4.3	5854	2.8
91-100	5.3	1.8	1500	4.6	6365	3.0
Top 100	299.5	100	32961	100	210116	100

Since 2007 there have been a number of mergers & acquisitions in Europe and North America, but they do not change the big picture significantly. Actual “mega-mergers” that would change the above landscape, have not occurred since 2007.

At first glance it would seem, that the industry is relatively consolidated, with top 10 producers grasping 34,8 % market share in paper and board. However, Table 10 lists only the shares of each group of the top 100 companies – there are over 756 pulp and paper companies in Europe alone.

The global production of paper and board in 2007 was 390 million tonnes, and the top 100 production was only 210 million tons. Easy arithmetic gives therefore a capacity share of 18.7 % for the top 10 producers of paper and board and share of total sales approximately 22 %. Assuming that the remaining small paper and board producers (many of which are in China and developing countries) produce lower quality products and have lower prices, an estimate of top 10 share of total paper and board sales is ca 25 %, as indicated earlier. In market pulp the situation is different – the top 10 produce 3,3 million tons and the global market pulp production is ca 60 million tons, so the top 10 producers have a global market share of slightly above 5 %.

There are difficulties in obtaining accurate production figures from many countries and there are several thousand mills and producers, many of which are very small and do not produce reliable statistics. Hence the above – somewhat complicated and awkward– approach for estimating the global consolidation degree.

So, it would seem that pulp and paper is a very fragmented industry and the leading producers have limited market power. Across the board and globally, that is valid. However, there are significant differences within regions and paper and board grades, as is shown in Table 11.

Table 11: Capacity shares of top 5 producers per grade and region (RISI 2007)

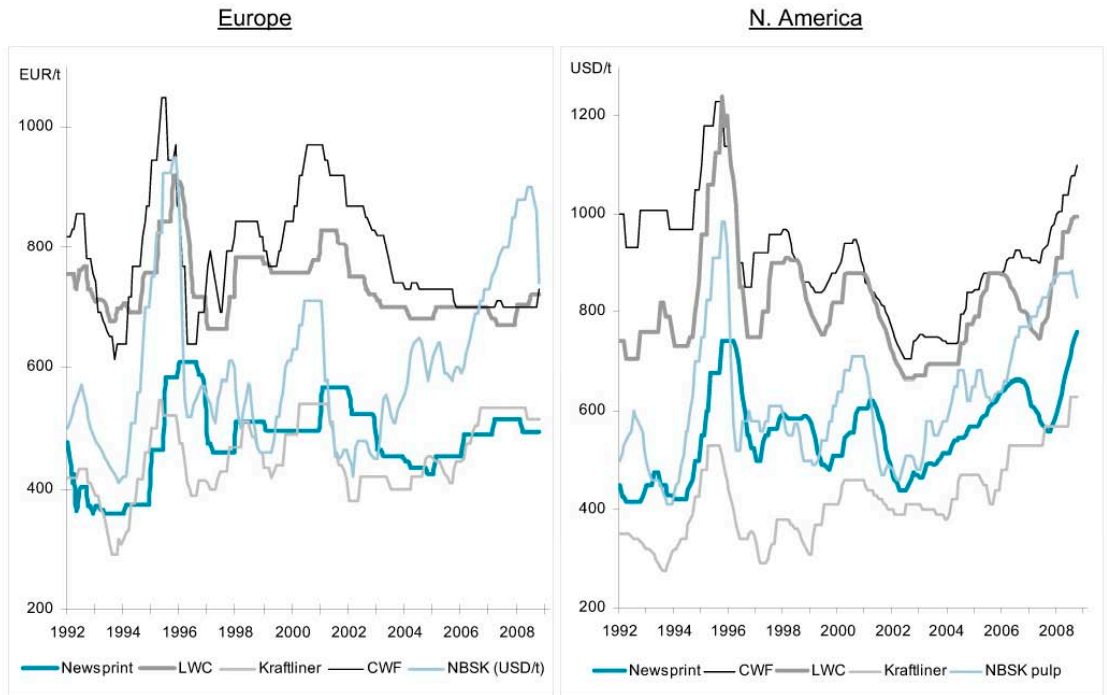
Product	Top 5 capacity share in 2006	
	North America	Europe
Newsprint	70	70
Uncoated mechanical	70	80
Coated mechanical	70	75
Uncoated woodfree	80	50
Coated woodfree	85	70
Cartonboard	60	50
Containerboard	60	35

As can be seen, some paper and board grades within a certain region are highly consolidated – for instance coated woodfree in North America and coated mechanical in Europe. Also, within these main grades the level of concentration differs between subgrades – for instance, the capacity share of top five producers of folding boxboard in Europe is approximately 90 % whereas in cartonboards (including also white-lined chipboard) the share is considerably lower. Although some consolidation since 2007 has taken place, the figures in Table 11 still provide a good overview of the degree of consolidation between different grades and regions.

It must also be noted, that the concentration degree between the top 5 producers is quite evenly distributed and the market leader's share does not exceed 30 % in any of the grades in Table 11.

6.2 Consolidation and pricing

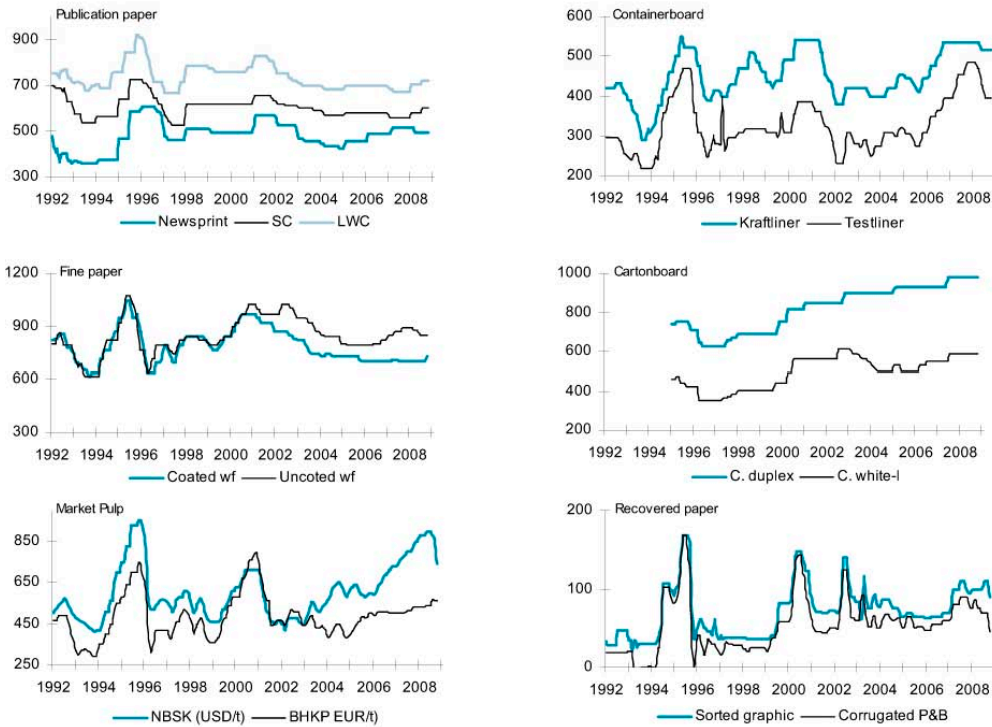
Despite the high degree of consolidation in some product groups within the main production regions, there is inconclusive evidence on its impact on improved pricing. This is shown in Figures 16 and 17, depicting the price development in North America and Europe in graphic papers and packaging grades:



3

Sources: PPI TW, RISI

Figure 16: Price development of selected paper and board grades between 1992 and 2008 (Nordea 2008).



Source: PPI TW

Figure 17: Price development of selected paper and board grades in Europe , 1992 – 2008, EUR / ton (Nordea 2008).

There has been heavy restructuring in North America in 2004-2007 especially in graphic papers – newsprint, fine papers and coated mechanical papers. Many older

mills producing these grades were closed and a number of big mergers such as AbitibiConsolidated and Bowater and NewPage's acquisition of Stora Enso's assets have taken place.

Possibly as a result of these actions, prices increased significantly until 2008, and since then they have decreased substantially. It may be, that the reduction in prices is mainly due to the current financial crisis, and once this is over companies are able to increase prices again. However, at the moment the price trend does not conclusively suggest that consolidation has enabled higher pricing.

The situation in Europe has been more stable, and companies have not been able to substantially increase prices for instance in coated mechanical grades and folding boxboard – despite the high consolidation degree, increasing costs and low profitability.

Theoretically, higher consolidation degree should lead to better capacity management, control of supply and improved pricing. So far, this has not happened – except possibly in the graphic paper sector in North America. Some of the reasons for this may be the intense rivalry between the top 5 producers, strong bargaining power of the biggest customers, limits set by competition authorities, the role of imports and the remaining smaller producers taking advantage of the actions by the market leaders. If the distribution of market shares between the top 5 producers would be more uneven and for instance the top two producers dominated the market with 60-70 % of the market, perhaps the market dynamics would be different and lead to also improved pricing. However, that is not the case in any of the main paper and board grades and markets.

6.3 Feasibility of increased consolidation

In order to fully realize the benefits of consolidation, the number of players in a given market should be limited. As shown in Figure 9, industries such as defense, tobacco, soft drinks and aircraft manufacturing are dominated by 5 or less players. If one considers the diverse pulp and paper industry as a single, one industry, achieving the same level of consolidation seems extremely difficult.

The top 10 companies today have ca 25 % market share of sales and as shown in section 6.1. produce 76 million tons of pulp and paper. To increase the level of consolidation of the top 10 to 50 % would require the acquisition of the same production capacity. The historical transaction prices per ton during 2000 - 2008 have been roughly 1000 USD/ton. It is easy to see, that achieving the level of 50 % consolidation for top 10 would require 70-80 billion USD of capital. Considering the historical profitability of the top 10 companies, raising this amount of capital from

the financial markets seems very difficult. The resulting level of consolidation would also still be only halfway to the level of the industries mentioned before and consequently the resulting benefits would most likely also be smaller.

However, considering that the industry is mostly regionalized and comprises of several different sub-businesses, increased consolidation in specific grades and within a certain region would require far less capital and therefore would be more feasible. During the past 5 years, some private equity houses such as Cerberus, Madison – Dearborn and Apollo Management have followed that strategy in North America. Over 25 % of North American paper capacity is currently owned by PE firms. It is possible, that a similar trend will happen in Europe and Asia once the current financial crisis gradually abates. While most private equity firms are mostly interested in high technology firms, real estate and health care, some invest also in troubled industries with an eye for turnaround and consolidation (Ernst & Young, Perfect match? 2008). This is one possibility for increasing the level of consolidation within other regions than North America. Besides other transaction considerations, the competition authorities of Europe and other regions will limit any single firm gaining a dominant position.

Based on above discussion, the feasibility of dramatically increased consolidation at a global level seems unlikely. Regionally and within a specific grade, there may still be some opportunities, depending on availability of capital (through normal financial markets or private equity) and the stance that relevant competition authorities take.

6.4 Main conclusions

Based on previous discussions and the theoretical section on consolidation, it seems that consolidation on its own will not dramatically improve the pulp and paper industry's profitability and competitive position:

(1) On the global level, the industry is far too fragmented at the moment, that it seems unrealistic that a sufficiently high level of consolidation could be achieved.

(2) The evidence that a high consolidation degree would enable better pricing, is inconclusive at the moment. It remains to be seen, whether the graphic paper sector in North America can improve its profits and pricing after the recent heavy restructuring. In Europe, consolidation has not so far led to improved performance, despite the high degree of consolidation in for instance coated mechanical reels and folding boxboard.

Consolidation in Europe and North America has not yet led to improved profitability. For instance, the biggest newsprint producer in North – America Abitibi-Bowater filed for chapter 11 protection in 2009.

(3) Rather than seek global consolidation, a more realistic target would be focused consolidation – gaining a strong position in a particular grade in one of the main production regions.

Theoretically, consolidation and high market share should lead to better profitability if the preconditions of increased economy of scale and/or differentiation are met. It seems, that there are many factors that act against these: the role of imports, smaller players taking advantage of market leaders, the bargaining power of the biggest customers and the intense existing rivalry. Perhaps due to these reasons the industry has not been able to fully realize the benefits of the regional grades that already are highly consolidated. The current structure consisting of 5 more or less equal producers apparently would need to change – a structure with only two dominant producers with combined market share 60-70 % might enable improved prices. But that is not the case in any of the main grades or markets.

However, increased consolidation and market share does bring many other significant benefits besides pricing: better capacity management and production allocation, sales network synergies and reduced administrative costs. Even if the process of consolidation and its eventual benefits is not yet complete, growth and profitability are the fundamental goals of most businesses, including pulp and paper.

7. COST EFFICIENCY AND TURNAROUND MANAGEMENT

Due to the low profitability for many consecutive years, most of the biggest pulp and paper companies have launched major cost reduction and profit improvement programs. A number of companies such as International Paper, Metsäliitto and Stora Enso launched these programs already in 2004, and since then many others have been forced to follow. These programs concern mainly North America and Europe – so far the Asian and South American companies have not been forced to do these.

7.1 Nature of the cost efficiency programs

Typically, the cost reduction programs have included at least some of the following components:

- (1) Review of the cost competitiveness of all production assets.
- (2) Divestment of non-core businesses such as forest lands.
- (3) Closure of unprofitable capacity.
- (4) Curtailment of purchased outside services, such as the use of consultants.
- (5) Reorganizations and downsizing.
- (6) Review of all purchasing contracts such as chemicals and logistics.
- (7) Sale lease-back arrangements of real estate – for instance head offices.
- (8) Reduction of fixed costs.
- (9) Minimizing of all investments except operative ones.
- (10) Outsourcing and shared service centers for finance, IT and procurement.
- (11) Reduction of working capital.

Not all companies have implemented all of these – the main focus of most companies is on fixed costs and personnel. Different companies are also in different phases of their reduction programs, depending on the launch dates, severity of their financial position and implementation progress. Another typical feature is, that these are organized as programs – with a senior executive responsible for coordination and set targets and timetables.

7.2 Success rate of cost efficiency programs

Officially, most companies that have announced efficiency programs declare that they have been successful and met all the targets. It is very rare, that a company advertises a failure – either in a acquisition or in major programs such as these. Reality, however, may be somewhat different, as can be seen from Figure 18.

- **“More than 66% of large scale projects fail to achieve their stated business objectives, are delivered late or are substantially over budget... It is not unheard of for 30–40% of a project's total cost going to rework.” Gartner Group**
- **Organizations are still failing to realize the benefits from their major programs – 73% of Captains of Industry agree that their business is increasingly challenged to assess risks and returns of major programs – Over 50% of Senior Executives believe that corporate effectiveness is constrained by a lack of delivery effectiveness in major programs.**
- **Success rates of the execution are not encouraging – 50% of programs go over budget – 58% of programs miss key milestone dates – 42% experience defects post completion (i.e., quality issues).**
- **The outlook is even more challenging as projects are getting bigger and more complex... presenting even greater risk to companies and greater expectations regarding benefits.**

Figure 18: Success rates of major corporate programs (Ernst & Young, 2008).

More often than not, performance improvement and success of the program leaves much to be desired. Ernst & Young carried out a survey in 2008 of cost reduction programs, interviewing over 115 multinationals in various industries. Results are shown in Figure 19.

Sustainability of cost reduction benefits within 115 multinationals (FTSE 350)
analysis of year-on-year performance, 2001-2006

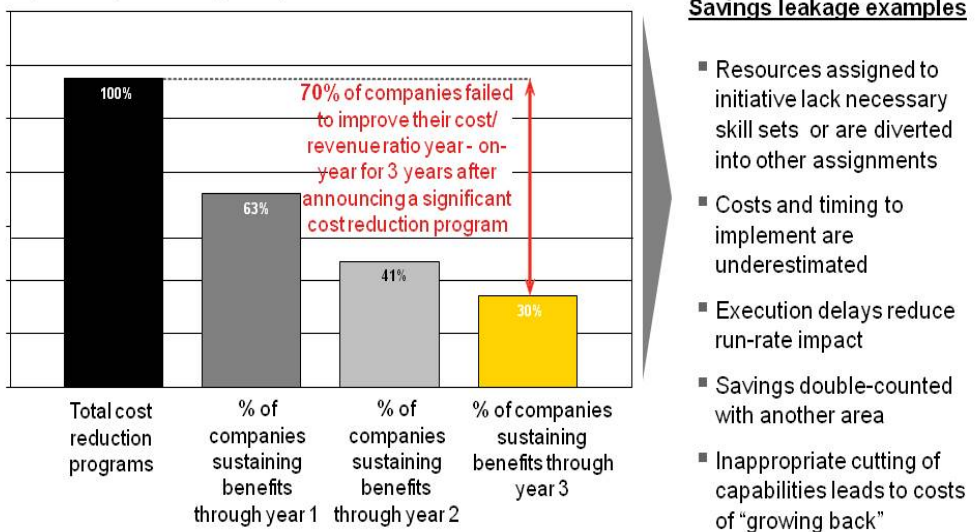


Figure 19: Sustainability of cost reduction programs benefits (Ernst & Young 2009)

As can be seen, 70 % of the interviewed executives were of the opinion, that the results of the programs did not lead to sustained and improved performance over 2 or 3 years.

Table 12 lists the development of total costs (Sales – EBITDA) of selected pulp and paper companies in Europe and North America. The figures include only the paper and board divisions, so for instance market pulp and corrugating packaging are discluded.

Table 12: Total cost development of selected pulp and paper companies in local reporting currency /ton (Company annual reports, 2005 - 2008)

COMPANY	2005	2006	2007	2008
International Paper (USD/TON)	668	684	686	721
Abitibi-Bowater (CAD/ton)		494	488	447
StoraEnso (EUR/ton)	567	624	638	662
UPM-Kymmene (EUR/ton)	547	552	561	576
M-real (EUR/ton)	761	769	684	662
SAPPI (USD/ton)	603	619	673	748

The above companies were selected based on their size and availability of divisional figures (note: SAPPI reports its figures in USD). It seems, that total costs of most companies have in fact risen between 2005 and 2008. The above companies have all reduced personnel, shut-down capacity and reduced fixed costs – but it seems that these painful measures have been insufficient to offset the rises in unit costs such as energy and chemicals and a sustained, significant profitability improvement is not yet evident from the financial figures.

7.3 Case studies regarding turnaround management in the paper industry

Ernst & Young carried out a qualitative study regarding turnaround programs in the European pulp and paper industry in 2007. The study focused on 12 business turnaround cases carried out in Europe between 1995 – 2005.

The focus of the study was on individual mills as profit units – although entire companies or divisions are often the targets of turnaround programs, the actual implementation has to be carried out in the profit units – in this case pulp and paper mills. The researcher was responsible for carrying out the interviews and analyzing the results, as well as writing the final report.

Altogether 12 different cases were analyzed, using interviews of key managers involved with the troubled mills. The cases covered fine papers, tissue, folding boxboard and newsprint. The interviews were carried out based on a standard questionnaire, pre-tested and performed personally – in order to ensure reliability of results, more than one person was interviewed when possible and results confirmed by financial figures when possible. The questionnaire used is presented in Appendix 3.

It must also be noted, that many of the cases took place several years ago, and although a standard interview questionnaire was used, not all the questions could be reliably answered by the interviewees and in many cases the interviews resembled more like a confidential discussion rather than a formal and well-structured interview. This must be taken into account when interpreting the results.

Due to the relatively small sample, the results cannot be statistically analyzed and they are presented in the following:

- 1) The financial situation of the 12 cases was mostly severe or very severe- with a negative or slightly positive EBITDA, and the future outlook was considered bleak. Only one of the cases had a reasonably good profitability, but its situation was deteriorating.
- 2) Usually the top or the divisional management initiated the program, demanding that the local management launches a cost reduction program. In three of the cases the program was initiated by a new mill manager.
- 3) Only five of the 12 cases were considered successful – with the targets set by the top management achieved. Five were considered failures, leading either to the closure or divestment of the unit. Two of the cases are still in progress.

- 4) A new business strategy was created in only some of the cases. Interestingly, the successful cases had – if not an actual new strategy – a more robust and comprehensive business plan or similar in place. Most of the others simply launched a cost reduction program. All the interviewed mill management members commented, that they were unaware of or did not participate in any thorough analysis at top management level regarding the role and future of their mills.
- 5) Failure to manage change and minimize personnel and labour union resistance were common factors to all the failed cases. A key factor in change management was active and open communication – if that was lacking, personnel involvement and commitment to change was missing, leading to failure.
- 6) The role of top management varied. Seven of the interviewees felt, that top management could have been more supportive and in some cases this was completely missing. However, there did not seem to be strong correlation between top management support and success – three cases were successful even if the local management felt it was on its own without support from the top.
- 7) Cost reductions played a critical role in all the 12 cases, with a heavy emphasis on personnel headcount and costs. Although all the interviewees claimed that also other factors such as customer relations and product development were taken into account, this could be verified with only 4 of the cases. Interestingly, three of these four cases were also successful. The focus seemed to be very much on costs.
- 8) Outsourcing – although very common in many other industries – did not play a significant role. Only four cases reported that outsourcing was a significant tool for improved efficiency. Typically these involved only IT, security or catering services. However, outsourcing has only very recently been applied more extensively in the paper industry, including also more business critical functions such as controlling and accounting.
- 9) Duration of the program ranged between two to four years. All the interviewees felt, that the very tight timetables set by the top management were unrealistic.

The results are quite well in line with the theory on change management and business turnaround. The change management approach has to be holistic – taking into account also the people and motivation issues in addition to the hard issues such as cost reductions. A new and compelling vision has to be put in place and it has to be communicated efficiently.

While targets and timetables often must be very challenging, they must also be realistic and achievable. Most turnaround programs are not successful – they are very hard and require very solid leadership skills from the local mill management. Based

on both the theory and the results of the case studies, the cornerstones of a successful turnaround program can be described as in Figure 20.

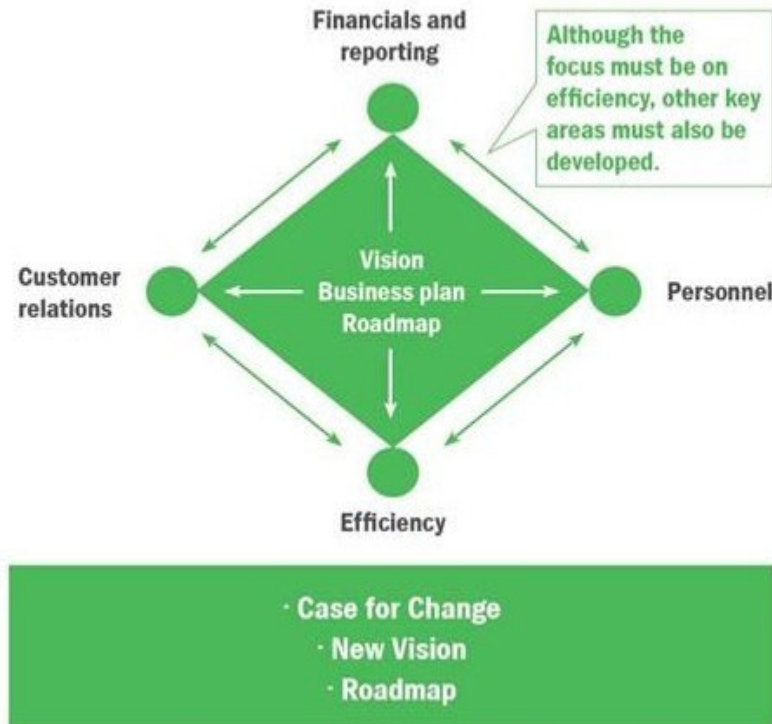


Figure 20: Cornerstones of a turnaround program in the pulp and paper industry

As is shown in Figure 20, the turnaround program must be based on a solid and robust platform. Creation of a new vision, roadmap for implementation and a compelling case for change are needed. None of the cornerstones in Figure 20 – efficiency, personnel, customer relations and financials & reporting – can be ignored completely, even though the focus usually must be on efficiency.

For instance, streamlining the product range in order to increase production efficiency can lead to loss of some key customers. Too harsh measures to reduce the number of personnel may lead to stiff resistance from personnel in the form of labour disputes etc, leading to production losses and extra costs. There has to be a balance between the main cornerstones – otherwise the program risks collapsing.

According to the study, top management has a number of choices when it considers the long term future of a particular business unit. The company can grow the business, withdraw, maintain or develop the unit, as is shown in Figure 21.

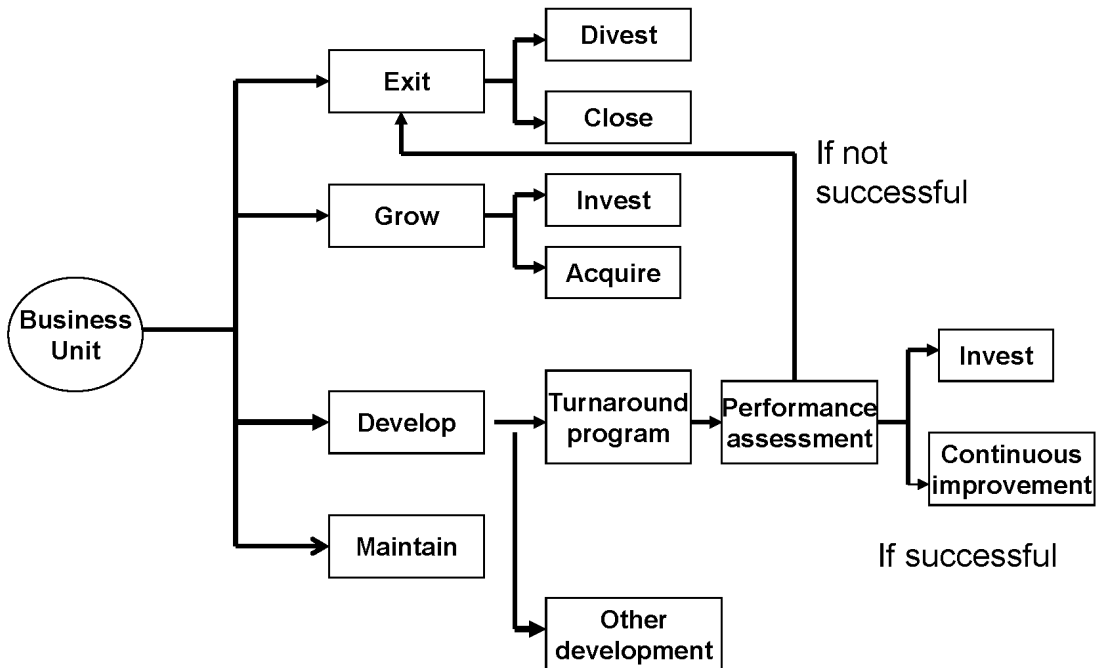


Figure 21: Different portfolio development alternatives for pulp and paper mills

Prior to making a decision which portfolio position is best suited and which strategic path to follow, a thorough and robust analysis is needed. Questions such as what are the reasons behind the deteriorated profitability should be asked. For instance, have the customer requirements changed or has the mill been neglected with regard to investments? Is the current mill management competent? How likely is it that the market situation will eventually improve? Are the mill's own long-term plans realistic? Is the unit needed for other more profitable business units? The interviews conducted in the study did not indicate that such an analysis by the top management had been carried out – however, it cannot be concluded that this has not been the case at some level.

If the top management – either at the divisional or corporate level – decides that the mill may have a viable future and that profitability can be significantly improved to a satisfactory level, the turnaround program is then launched. If that is not the case, the company has to consider exiting from the business either via divestment or capacity closure.

As the results show, turnaround programs do not always succeed – only five out of the 12 cases studied were ultimately successful. If a performance review shows that the mill is not meeting its goals, company managers usually return to evaluating the options and normally decide to exit the business. Most programs of this nature unfortunately are not successful. In recent years this has been the case for many pulp and paper mills in North America and Europe, which have been closed due to low profitability and deteriorated competitiveness.

According to the case studies, at least the following factors contributed to the failure of the turnaround program:

- (1) A new strategy and/or business plan is not robust enough – consequently the sense of new direction and the platform for change is missing.
- (2) Emphasis is only on rapid cost reductions, at the expense of many other critical factors – the approach is not holistic.
- (3) Unrealistic demands and timetables are set – as the results show, typical duration of a successful program is between 2 and 4 years.
- (4) Communication is not open and effective, leading to uncertainty and resistance to change.
- (5) The right leadership skills needed for managing the program are not available.

Based on above, it is evident that successful management of a business turnaround is time consuming, very challenging and requires exceptional leadership and analytical skills. This combination is often not easy to find.

7.4 Main conclusions

Despite extensive cost reduction and profit improvement programs of most big pulp and paper companies in North America and Europe for several years now, profitability has not significantly improved. A number of well-known North American companies such as Abitibi-Bowater and Smurfit-Stone have in fact filed for chapter 11 protection to avoid bankruptcy, and many European companies are relaunching new and successive waves of cost reductions.

The business turnaround of the industry as a whole has not been so far successful. There are many reasons for this:

(1) As shown in Table 12, the total costs of some companies have in fact increased, due to increasing unit costs of energy, chemicals, fiber etc. The cost reductions have on their own not been sufficient to compensate for this.

(2) As shown earlier in Table 6, the cost structure of a typical paper mill consists of 50-60 % of fiber, chemicals and other materials, which are priced on an open and global market. Costs that are directly under the control of the mill management – fixed costs etc comprise only ca 20 % of total costs. Reducing variable costs in the form of changed product recipes, more efficient power plants, alternative fiber sources and debottlenecking production may require investments and time. Good production management can improve efficiency, but often that is not enough.

(3) Fewer than one in three cost reduction programs (Figure 19) according to the Ernst & Young study brings sustainable and significant cost benefits. Somewhat more encouraging results - five out of twelve – were retrieved from the case studies on paper industry turnarounds.

(4) Some of the critical success factors for improved business turnarounds based on the case studies are a robust business plan acting as the case for change and showing the new direction the mill must take. Effective communication, realistic timetables and targets are also very important. Strong leadership skills are vital for success at the local management level. Unfortunately, most of these programs fail.

(5) Pulp and paper companies Western Europe and North America have for some time been operating in a mature market and challenging business environment. Increasingly, their senior management has been forced to make difficult choices regarding their asset portfolios, as shown in Figure 21.

Based on above conclusions, it is likely that cost reduction programs need to be continued. Turnaround management is becoming increasingly important when the future of individual business units is evaluated – whether it concerns permanent closures, divestments or turnaround programs. But there is insufficient evidence to conclude that these measures and management techniques on their own will lead to a significant and sustained profitability improvement.

8 THE ROLE OF EMERGING MARKETS

Theories on internationalization and emerging markets have been presented in section 2.8 and an overview of the main production regions under section 3.1. This chapter deals with their deeper application to the global transformation process underway in the industry, with specific focus on Brazil, Russia, India and China.

8.1 Pulp and paper industry's current level of internationalization

As discussed in section 2.8 regarding internationalization and globalization theories, there does not seem to exist a universally accepted theory on the evolution of a purely domestic company into a globally operating multinational. Academic research and debate continues.

Perhaps the most simplified model is the adaptation of the product life cycle model by Vernon (Vernon, 1979), where companies gradually internationalize as their home markets become mature. Similarly, Chandler's (Chandler, 1962) resource-based model which treats internationalization process as a form of diversification leading to various structures, is reasonably straightforward. More recent models by Doz, Hamel and Prahalad (Doz et al, 1987) deal with already internationally operating multinationals which have different structures and systems of operating. The theories seem to vary in their complexity – a company that is currently focusing just on exports and in the beginning of the learning process may be better suited for the stage theories, whereas the more recent and complex theories seem to be better suited for companies already operating as “genuine” multinational corporations – for instance Nokia, General Electric, IBM, Sony etc.

It seems, that the pulp and paper industry is still in the relatively early phases of globalization: close to 80 % of the sales of the top 10 companies are derived from the home region in 2008 (PPI Top 100 list). These are presented in Table 13.

Table 13: Share of sales outside home region for selected companies (company annual reports 2008)

Company	Home region	Share of sales outside home region 2008
International Paper	North America	21.5 %
Kimberly-Clark	North America	48.0 %
Stora Enso	Europe	20.0 %
SCA	Europe	22.0 %
UPM- Kymmene	Europe	27.0 %
Weyerhaeuser	North America	22.0 %
Smurfit-Kappa	Europe	24.5 %

It must be noted, that three companies included in the PPI top 10 index – namely, Georgia – Pacific, Oji Paper and Nippon Paper – do not publish their geographic distribution of sales. However, all of these companies have the clear majority of their assets and operations based in their home regions of North America and Japan. Another major European producer – Metsäliitto, which is not included in the PPI top 10 listing because the list includes only operations from pulp and paper – generates only 11.0 % of its turnover from regions outside Europe. More importantly, the above listing in Table 13 includes also exports in addition to operations outside outside the home region – a more relevant measure of level of globalization would be the share of turnover generated only from operations outside the home region – unfortunately, only a few companies report that.

Relatively few of the top 100 companies in 2009 have production operations on two or more continents. These are presented in Table 14.

Table 14: Inter-regional operations of biggest pulp and paper companies, 2009 (Company annual reports, 2008)

Company	Production operations					
	North America	South America	Europe *	Asia	Africa	Australasia
International						
Paper	X	X	X	X		
Kimberly-Clark	X	X	X	X	X	X
Georgia-Pacific	X		X			
Weyerhaeuser	X					
Abitibi-Bowater	X		X			
StoraEnso		X	X	X		
SCA	X	X	X			
UPM-Kymmene	X	X	X	X		
Sappi	X		X	X	X	
Myllykoski	X		X			
Norske Skog		X	X	X		X
Smurfit-Kappa		X	X			

* Including Russia

Geographically, very few of the biggest Asian or South American companies such as Nippon Paper, Oji, APP, Ballarpur Industries, Aracruz or Votorantim have production operations outside their home region – Asia or South America. The South

African companies Sappi and Mondi are more international than average, with majority of their sales generated outside of Africa.

Considering, that the above companies have ca 30 % share of the total world capacity (as discussed in section 6.1) and that the share of total sales generated by regions other than home region is less than 20 %, it can be stated that the pulp and paper industry is still mostly regional and in the early phases of globalization.

This is despite the fact, that many of the above companies have stated for many years as one of their strategic goals growth in the other continents and have also attempted major transactions to reach that goal. Some examples are Stora Enso's acquisition of Consolidated Paper in 2001 and subsequent withdrawal from North America in 2008 and UPM –Kymmene's joint venture with APRIL in South East Asia and China in 1999 – which was discontinued in 2000 as a result of the Asian financial crisis of 1999. Company annual reports and investor presentations of Stora Enso, International Paper, Sappi, SCA and others announce their intentions to grow either in South America, Russia or China.

The globalization process has not had a major impact on the company organization or structures. Of the companies listed in Table 14, none have established a separate International Division responsible for all business outside the home region. None of the annual reports of the above companies report regions such as Asia-Pacific as a separate section with published key figures for sales and earnings – this information is normally included in the notes to the consolidated income statements. In very few cases does the senior management board include executives with the title of for instance Executive Vice President, South America or EVP, Emerging markets. While a number of companies have a regional company and regional managing director with local subsidiaries, the publically available information found in annual reports and other publications regarding corporate governance and profit responsibility does not indicate that the regional companies would have a clear profit and business responsibility. This seems to lie clearly in the divisions.

Based on above, it seems that the stage- and the strategy-structure models on internationalization apply best for the industry – product life-cycle model, learning curve and diversification. That is, the above companies basically follow an adaptation of these models and are striving to expand in other regions mainly due to the following reasons:

(1) Home markets are at the mature or decline phase of their life-cycle, as discussed in chapter 3. This means increasing investments and involvement in markets within other regions, with possibly also the shifting of production completely from the home region to other markets at the end of the process.

(2) Gradually, over the past 20 years the industry has gained experience through exports and operations in the more distant markets. The “psychic – distance” (Johansson and Vahlne, section 2.6) has decreased and there is more confidence in foreign operations.

(3) Expanding inter-regionally can also be seen as a form of diversification. A significant share of sales derived from other than home regions balances the market mix, may be a source of new innovations and product variations and depending on the region may reduce currency exchange risks.

Most likely all of the above contribute to the attractiveness of inter-region expansion – however, the fact that home markets are mature or declining is probably the most significant driver.

As presented in Figure 10 in chapter 2, according to the study carried out by Ernst & Young the overwhelming majority – 62 % - of the companies interviewed listed growth as the primary driver for investing in emerging markets (ie, other regions than North America or Europe). Lower costs or improved efficiency was mentioned by only 14 % of the respondents, and profitability of the investment and secure supply chain were listed as 10 % and 6 % respectively. The results support the view, that the stage models seem to apply to many companies and industries – if certainly not all.

8.2 Role of cost efficiency in inter-regional expansion

However, the above-mentioned study did not focus specifically on pulp and paper industry, and especially the cost efficiency aspects need to be analyzed further. Table 15 summarizes some of the the cost competitiveness factors of various regions, based on the cost levels of 4th quarter 2008.

Table 15: Unit cost factors of main production regions in USD/ton, 4 Q 2008 (RISI, 2009)

Region	Round hardwood 1)	ONP 2)	Crude oil 3)	Electricity 4)	Operator wages 5)
Brazil	95	111	64	0.10	10.7
China	150	264	75	0.08	3.7
Canada BC *	99	164	93	0.04	31.1
Finland	155	142	76	0.09	42.5
Germany	160	184	77	0.14	41.8
Russia	98	-	32	0.05	11.1
Sweden	140	138	103	0.09	38.2

* Canada, British Columbia

- 1) In USD/BDMT (Bone-dry metric tons)
- 2) Old Newsprint, in USD/ADMT (Air-dried metric tons)
- 3) In USD/BBL (Barrels)
- 4) In USD / kWh
- 5) In USD /hours

A more complete comparison including all the main production factors is included in the appendices.

Based on Table 15, one can observe that apart from the price of wood and wages and salaries, the other cost factors are very close to each other and appear to be based on global market pricing. The differences also reflect the local availability of resources: fiber – whether based on virgin or recycled fiber – is quite expensive in China and Finland, whereas virgin fiber is very cheap in Brazil and Russia.

Other factors that need to be considered are the following:

- (1) Proximity to major markets and transport costs – these range from 10-15 % of total costs.
- (2) Capital costs, availability and price of capital.
- (3) Production efficiency is quite difficult to compare between companies and regions because of varying definitions for productivity and efficiency. However, total production capacity per machine line gives a sufficiently good indication of machine

efficiency. It does not, however, provide insights into the actual productivity, since the actual production and the required inputs are not known. Comparison of average production capacity per production lines and grades between main production regions is presented in Figure 22.

(4) Product quality and service issues. Many customers – whether in Asia, South America, North America or Europe – have specific requirements for the service levels and especially in the form of guarantees of delivery reliability. This places certain additional burdens on the inter-regional suppliers – either in the form of increased stocks to guarantee delivery or as a result of lower service level, reduced prices.

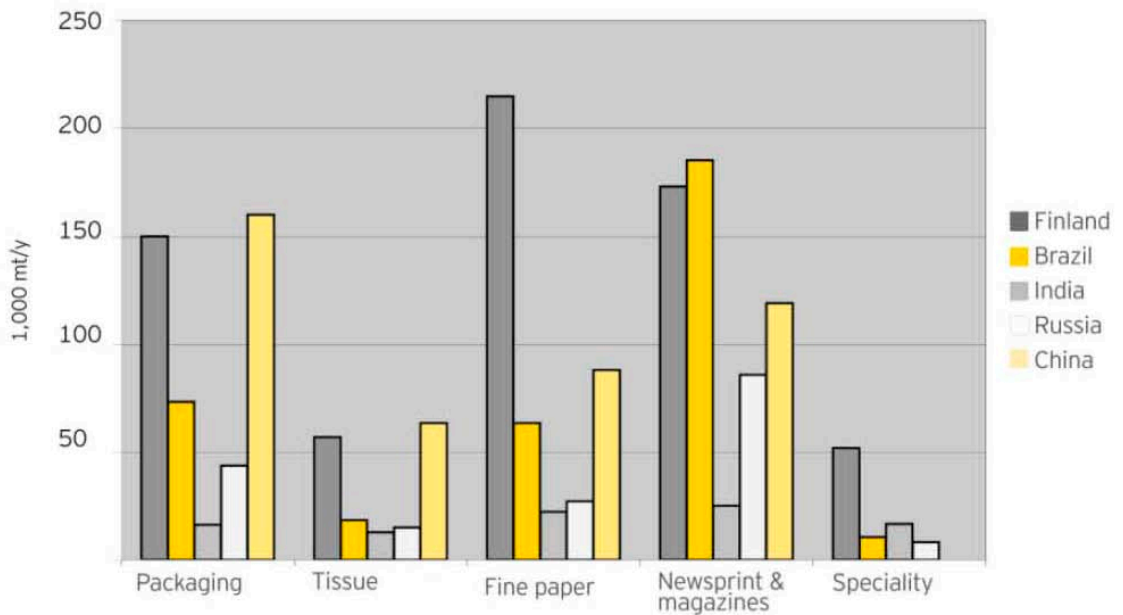


Figure 22: Average machine capacity by grade and producing region in 2007 (Lockwood Post, 2007).

In Figure 22, Finland has been selected as a benchmark representing Europe and North America, since traditionally the Finnish paper industry has invested heavily into new machines and rebuilds, whereas other countries such as United States and

Western countries. The results are based on paper machinery data of 2007, but since then very few investments either in the above countries or elsewhere have been made, so most likely the results of Figure 22 are still very accurate.

As can be seen from Figure 22, the average machine capacity per grade is significantly higher in Finland than the average capacity of Brazil, Russia, India and China. The fact that Brazil has a higher capacity per machine in newsprint and magazine papers can be attributed to the low number of machines producing these grades in Brazil – there are altogether 3 machines whereas Finland has 25 paper machines producing these grades.

The conclusions from Figure 22 are, that there are significant differences in production capacity between the main producing regions. It must be noted, that there have been several big and very modern production lines built in recent years especially in China. However, considering the size of the Chinese paper industry and the fact that there are still several thousand very small production lines in China, the average production capacity is still very much behind Western standards.

However, machine width as a measure of production capacity has its limitations, and a more common method of assessing cost competitiveness is asset quality, which takes into account also the technical age of the machinery as well as the capacity. The technical age consists of the age of the machinery as well as significant rebuilds that have been implemented. While this method is most likely more accurate, it also includes several estimations, such as the actual impact of a certain rebuild on the technical age. Also, the technical age and capacity are to a large extent defined by machine width – for instance, paper machine widths have increased during the past 20 years and typically the machines with higher technical age are also more narrow. Therefore for the purposes of this research machine widths as an indication of relative asset quality are a reasonable estimate.

The relative asset quality – as discussed above based on machine widths – has big implications when considering the actual cost competitiveness of different production regions. By and large, Western companies are able to compensate for the higher input costs by higher efficiency.

However, in one extremely important factor the above conclusions are not valid – namely, hardwood pulp production in the Southern Hemisphere. As can be seen from Table 15, the wood costs for eucalyptus and acacia pulp are a fraction of the costs for producing bleached hardwood pulp in the Nordic countries or Canada – the main supplying regions. This will have a significant impact on the fiber flows of the global industry.

Summary of the most important cost competitiveness factors is presented in Figure 23. As can be seen, the overall picture regarding cost competitiveness between different producing regions is not straightforward and for instance China and India do not necessarily enjoy a cost advantage except in labour costs and in the case of China, also financing costs. These can be to a large extent compensated by higher production efficiency and other factors. Although also Russia appears to be extremely competitive due to low wood costs, possible problems with the availability and reliability of wood supplies can significantly reduce the cost advantage.

Besides fiber, location and capital costs are also very significant. Finland and Russia suffer from a longer distance to market, whereas Canada, Germany and China have the advantage of proximity to a major market. The Chinese producers also enjoy relatively low capital costs – a major part of a greenfield investment consists of civil engineering and construction, which are labour intensive and consequently cheaper. Many non-core parts of the production process can also be sourced from China at a lower cost than corresponding equipment in the West.

Factor	Finland	China	Brazil	India	Russia
Dominant fiber	Virgin	Recycled	Virgin	Recycled	Virgin
Fiber availability	Medium	Low	High	Low	Medium
Main products *	- Graphic - Packaging - Tissue - Market pulp	- Fine - Packaging - Tissue	- Fine - Packaging - Market pulp	- Fine - Packaging	- Graphic - Packaging - Market pulp
Average machine capacity (2008)	160	120	70	40	90
Cost factors					
- wood (at mill)	High	High	Low	High	Low
- Recycled fiber	Low	High	Low	High	-
- coal	High	Medium	Low	Medium	Low
- electricity	Medium	Medium	Medium	High	Low
- labor	High	Low	Low	Low	Low
- investments	High	Low	Medium	Medium	High
Main markets	Europe	Local	Local and overseas	Local	Europe
Distance to market	Medium	Short	Medium	Short	High

* The category "Graphic papers" includes publication papers such as newsprint and coated mechanical reels, as well as the subcategory "Fine papers" (both coated and uncoated).

Figure 23: Summary of cost competitiveness between certain production regions

The role and importance of cost efficiency varies between regions and different products. It seems, that only hardwood market pulp based on fast-growth plantations enjoys a clear cost advantage – in other products the situation is much less clear-cut.

8.3 Entry strategies

The pulp and paper companies that have pursued a growth strategy in the emerging markets have chosen a relatively cautious approach, as can be seen from Table 16 listing the most recent major growth projects in the emerging markets.

Table 16: Recent growth initiatives by Western companies in emerging markets (company announcements in 2005-2009)

Company	Project
International Paper	Joint ventures with Sun Paper and Ilim Pulp
Sappi	Joint venture with Shandong Chenming in LWC
Stora Enso	Joint venture with Shandong Huatai
Stora Enso	Joint venture with Aracruz in Veracel and with Arauco in Uruguay
Stora Enso	New pulp mill in China (planned)
Stora Enso	Acquisition of Arapoti paper mills in Brazil
UPM-Kymmene	Joint venture with Sveza to build a pulp mill in Russia (now postponed)
	Joint project through Metsä-Botnia for a pulp mill in Uruguay
SCA	Tissue mill in Svetogorsk, Russia
SCA	Acquisition of a major feminine care producer in Argentina

Most of the above expansion projects are joint ventures to build a greenfield mill. A more ambitious strategy has been pursued by Norske Skog, which has expanded rapidly in Asia – first through a joint venture (forming of PanAsia Paper) and subsequently acquiring majority in the venture. However, Norske Skog has subsequently divested some of the assets – the newsprint mills in South Korea and China.

Joint ventures offer many advantages as an entry strategy. Risks are shared, capital requirements are lower and a local partner brings understanding of local cultures and markets as well as important government and other contacts to the table.

However, there are also significant downsides in joint ventures for new capacity:

(1) Agendas between the partners may vary, possibly leading to conflicts

- (2) Control issues
- (3) New production capacity adds to the global over-capacity in many grades.
- (4) As a vehicle for growth, it is relatively time consuming.

Due to above reasons, most joint ventures do not last more than 5-10 years (Pacek & Thorniley, 2007). The only major joint venture in this industry that has lasted longer than this seems to be Metsä-Botnia - between Metsäliitto and UPM Kymmene. The other joint ventures that are listed in Table 16 are still quite recent, and time will tell how long-term they will become.

Mergers and acquisitions are a faster strategy for entry. There are no issues regarding control or different agendas, and no risks related to greenfield investments. However, the assets that are acquired might not always be world-class – something many Western companies are wary of. There are significant risks regarding the reliability of accounting figures, tax issues, legislation, corruption and fraud. Table 17 lists some of the major differences in mergers and acquisition practices between Western countries and BRIC – countries.

The success rate of mergers and acquisitions is not an impressive one. According to research, nearly 70 % of M & A projects do not meet their targets. This is the track record in the West – it is considerably more challenging to carry out a successful acquisition in the emerging markets. Some of the issues to be considered are the following:

- (1) Due diligence processes are typically more difficult and time-consuming than in the West. Each figure should be treated with caution, because of problems of accounting reliability.
- (2) Use of local and professional advisors in areas such as tax, accounting and legal issues.
- (3) Relationships are typically more important than in the West. Friendship is often the prerequisite of doing business.
- (4) Flexibility and adaptation to the local cultures.
- (5) Realistic targets and timetables – long –term view is necessary.

	Western countries	BRIC
Current levels of activity	<ul style="list-style-type: none"> Very subdued due to current financial crisis and turbulence of the stock markets 	<ul style="list-style-type: none"> Strong recent growth but now very subdued due to the financial crisis
Timeframes	<ul style="list-style-type: none"> Transaction timeframes are relatively quick (usually up to six months) 	<ul style="list-style-type: none"> In cross-border transactions timing can be in excess of a year But due to the financial uncertainty, time for the quick transaction is coming Building relationships is important for the timeframe
Transaction process	<ul style="list-style-type: none"> Established history and usage of M&A; 'standardized' transaction procedures 	<ul style="list-style-type: none"> Understanding of the process and importance of advisors has grown significantly during the last few years
Deal structures	<ul style="list-style-type: none"> Predominantly "clean" transactions with a single purchaser selling a 100% stake 	<ul style="list-style-type: none"> Structures more complex, often with the use of off-shore vehicles for tax, ease of exit, financing considerations
Financing	<ul style="list-style-type: none"> A variety of financing options available 	<ul style="list-style-type: none"> Mostly cash consideration Sophisticated financing instruments emerging, yet legislation lagging behind
Market data	<ul style="list-style-type: none"> Market data (in terms of market size, growth, market shares etc.) readily disclosed and available 	<ul style="list-style-type: none"> Market data less readily available and is often out of date given rapid changes in marketplace

Valuation	<ul style="list-style-type: none"> Strong financial/management information systems in place; reliable historical data Analytical review and performance monitoring along a range of key performance indicators Rigorously assessed future projections 	<ul style="list-style-type: none"> Generally weak finance functions. Captains of the industry are exceptions Analytical review and performance monitoring focused on a small number of key performance indicators. Captains of the industry are exceptions Future projections are rarely forecast in detail and are often not fully thought through. Captains of the industry are exceptions
Financial data	<ul style="list-style-type: none"> Strong financial/management information systems in place; reliable historical data Analytical review and performance monitoring along a range of key performance indicators Rigorously assessed future projections 	<ul style="list-style-type: none"> Generally weak finance functions. Captains of industry are exceptions Analytical review and performance monitoring focused on a small number of key performance indicators. Captains of industry are exceptions Future projections are rarely forecast in detail and are often not fully thought through. Captains of industry are exceptions
Negotiations	<ul style="list-style-type: none"> Tend to be commercially focused and "results-driven" 	<ul style="list-style-type: none"> Negotiations may concern objectives which are not purely commercial
Regulatory environment	<ul style="list-style-type: none"> Minimal interference on private deals Regulations highly transparent Usually easy to enforce 	<ul style="list-style-type: none"> Rapidly improving, but still opaque by international standards Numerous regulatory and corporate compliance requirements (antimonopoly approval of transactions)

	Western countries	BRIC
Normal duration	▶ 1-8 weeks	▶ 1-8 weeks
Basis of financial information	▶ US GAAP and IFRS	▶ Predominantly management accounts, local GAAP in small to mid-sized companies.
Auditing and corporate governance	▶ Standards driven ▶ High quality of corporate governance	▶ Local auditors for small to mid-sized companies ▶ International auditor for public, leveraged and large companies
Reliance on computerized systems	▶ Typical	▶ Generally weak. Exception public companies and captains of the industry ▶ Generally low. Exception public companies and captains of industry
Enforceability of indemnification	▶ Strongly enforced and backed by legislation and courts	▶ Enforceability by using international law in transactions

Table 17: Differences in transaction practices between Western and BRIC – markets (Ernst & Young, 2009).

As can be seen from Table 17, there are substantial differences in the M & A practices between the BRIC markets and the Western markets. However, there are major differences between the BRICs also: China and Brazil are implementing IFRS (International Financial Reporting Standard) accounting standards in 2010 and 2011, respectively, and this harmonizes accounting practices and improves data transparency. India and Russia still rely on local GAAPs (Generally Accepted Accounting Practices), and although reliability and transparency have improved, they still present significant risks. Tax issues also vary between the countries, as do the legal processes safeguarding foreign investors.

All three entry strategies – greenfield investment, joint venture to build new capacity and acquisition – are fundamentally different. The approach that a company chooses has to be based on its strategy and the relative importance of speed, risk sharing, control and modern production facilities.

A key determinant of the balance between these is the company's past experience and the competences it has gained. If a company has been very successful in investment projects it may choose the greenfield approach. If on the other hand the company has been unsuccessful in making acquisitions, it may decide to take the longer approach in the form of a joint venture. And if the company has already operated in the market in question for a longer period of time and feels it knows the market and local cultures, it may proceed via an acquisition.

8.4 Challenges of growing in the emerging markets

As shown in Table 13, very few pulp and paper companies derive a significant share of their sales from other regions besides their home region. Considering that even the biggest firms – which have only a 25 % share of global capacity – generate only 10-20 % of sales from international operations, the entire industry can be characterized as regional. Some of the reasons for this are the following:

- (1) Home markets have – until recently – still offered growth opportunities. The markets have grown and companies have been able to grow through mergers and acquisitions, as well as investments.
- (2) Also the industry's customers have been mostly local. Although there are some globally operating publishers such as News Corporation and Time Warner and especially the big consumer products companies such as Unilever and Danone are global, their share of total production is still relatively small. Furthermore, they have not pursued a global procurement strategy and required that all their suppliers have production capacity for instance also in China.
- (3) Many of the most interesting companies in the BRICs have not been up for sale. The local markets grow rapidly and due to the accumulated capital reserves, access to capital has not been restricted. Many of these firms are also family-owned and do not want to exit from the business.
- (4) Big Western companies have focused on restructuring their home regions and on the profitability improvement. Some of these have had to ensure their own survival, rather than investing abroad.
- (5) Many recent acquisitions have been less than successful, and companies have become more cautious.
- (6) Companies have become more aware of the risks inherent to the emerging markets.

However, it seems likely that some of the above factors are changing:

- (1) Home markets have become mature and growth via M & A is increasingly limited due to for instance competition regulations.
- (2) The current financial crisis has hit also the emerging market companies, and they have had to cancel or postpone many investments. It is likely, that some of these may become distressed or otherwise need financing and therefore more acquisition or joint venture targets may become available.
- (3) Some of the biggest pulp and paper companies have been operating in for instance China or Brazil already several years. Consequently they have become more confident regarding the risks involved.
- (4) The industry's customers such as the consumer product companies are increasingly investing in the BRICs and shifting their production there. Even if this does not lead to requirements for setting up production close to the customers' production sites, many companies want to stay close with their biggest customers.

An additional driver for increased interest in the BRICs may be the fear of increasing exports and price disturbances for instance from China to the home regions. A joint venture or an acquisition of a major Chinese producer may facilitate better control over this – ie, the motivation behind such a move may then also be defensive.

The above issues naturally apply differently to different companies, depending on their strategy, financial resources and product portfolio.

8.5 Main conclusions

The global landscape of pulp and paper is changing, as shown in Figure 11. The different production regions are in different development phases, with rapid growth in both the consumption and production in the BRICs and maturity and restructuring in North America and Europe. This offers both opportunities and challenges for the companies in these regions.

Contrary to popular belief, cost efficiency does not seem to be significantly better in the BRICs than in the West – the exception is plantation wood pulp in South America and South East Asia. The main cost factors of pulp and paper are the variable costs such as virgin or recycled fiber, chemicals, oil, coal and electricity. These are commodities that are traded based on global pricing, and companies for instance in

China and India have to import these at market prices. The lower labour costs can be at least partly compensated with higher efficiency and better product quality in the West – despite the enormous investments in new and modern capacity in China, the industrial average efficiency is still below that of for instance Finland.

The primary driver of the interest of the Western companies in the emerging markets is the growth prospects they offer, combined with the limited growth opportunities in the home markets. Access to low cost fiber is an additional driver for some companies to grow in South America or Russia.

Most Western companies have adopted a reasonably cautious strategy regarding the emerging markets. Despite announced expansion plans for many years now, the share of total sales generated from the emerging markets is still quite modest. Joint ventures and greenfield investments have been the preferred entry strategies, and although there are many benefits in this approach, it is also a slow strategy.

It seems likely, that more and more Western companies will re-evaluate their strategy towards the BRICs and pursue a more aggressive approach based on acquisitions. Growth opportunities in the home regions are severely limited due to low market growth and limited scope for consolidation, and according to theories on internationalization many firms in the mature phase seek growth abroad.

Despite the risks, acquisitions offer the fastest way to grow and establish presence in these markets. Joint ventures are an alternative, but they may be problematic because of possible differing agendas. Greenfield investments, while ensuring world-class production units, inevitably contribute to the global demand and supply imbalance that many grades are still suffering from. Some additional reasons are the increased confidence in transactions due to experience of operating in these countries for some years now and the likelihood that more and more suitable acquisition targets become available as a result of the current financial crisis.

9 FUTURE OUTLOOK OF THE PULP AND PAPER INDUSTRY

A major part of this research consisted of in-depth interviews regarding the future development of the industry. Altogether 36 interviews were conducted in 8 countries and a wide range of issues were covered.

9.1 Methodology

The interviews were carried out by the researcher and his colleagues at Ernst & Young in 2007. A standard questionnaire was used as the basis for the interviews, of which 20 were carried out personally, 10 over the telephone and 6 via mail or fax.

The respondents were asked to rank 60 specific issues in their order of importance from 1 (meaning not important) to 5 (very important) to enable a quantified and statistical analysis of the results. Two of the questions – regarding anticipated level of industry consolidation and the most appropriate level of R & D funding – were multiple choice questions, asking the respondent to indicate his or her preferred choice out of 5 different answers. The questions were organized under three separate sections: global trends and regional development, industry challenges and business risks and industry future.

Some of the issues were covered more than once. These were the role of electronic media (twice), increasing capacity in emerging markets (twice), industry consolidation (four times), R & D funding (twice), new product development (twice) and foreign exchange (twice). Besides highlighting the importance of these issues and covering them from more than one perspective, they also served as control questions to validate the results and uncover any inconsistencies in the responses.

Additionally, the respondents were invited to provide comments and quotations of any particular issues or points, which they felt needed more attention.

An important part of the verification of the results was the presentation and discussion of the results with the senior management of several pulp and paper companies.

This was conducted after the compilation of the report, and representatives of the following companies participated:

Stora Enso
Metsä-Botnia
M-real
UPM - Kymmene
Kemira
SCA

Holmen
Finnish Forest Industries Association
Metso Paper
Asia Pulp & Paper

Typically, the respondents and the participants of the review meetings represented senior management – at the level of Vice President or above. Additionally, the reports were distributed widely throughout the industry – altogether 1000 copies in Europe, North America, South America, South Africa, India, Indonesia and China. The reports generated a lot of interest amongst the senior management of the industry as well as the local media.

The methodology is presented in more detail in section 1.5 and the questionnaire used is presented in Appendix 1.

9.2 Results of the interviews

The interview results per category are shown in Figures 24 – 31.

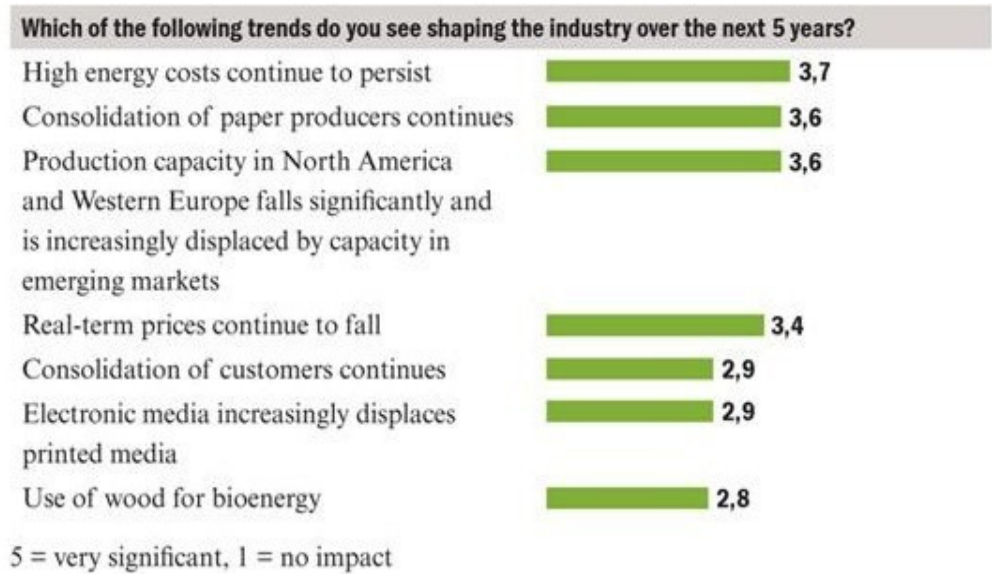


Figure 24: Most significant industry trends according to interviews

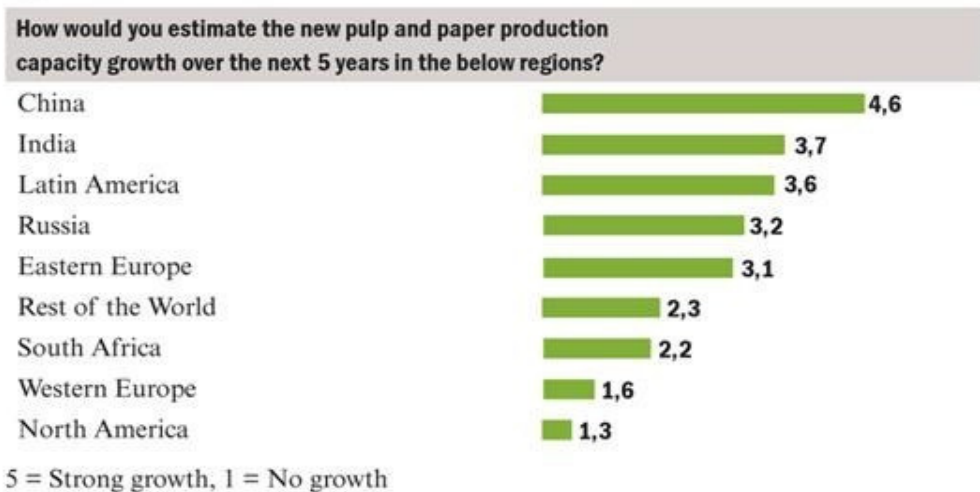


Figure 25: Development of production capacity per region according to interviews

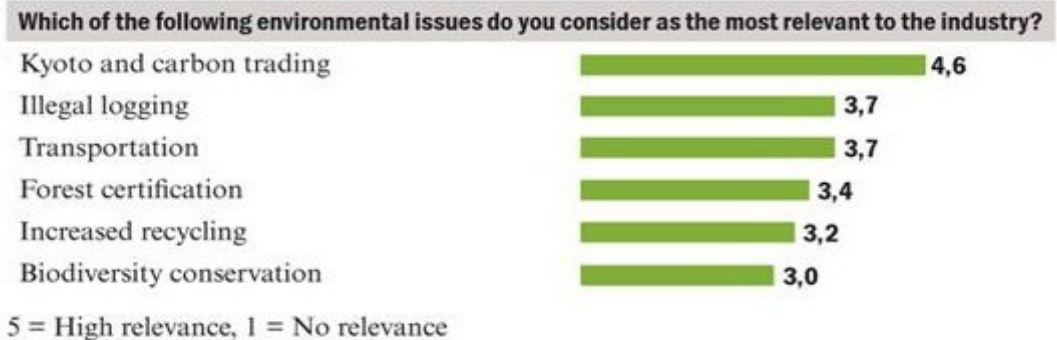


Figure 26: Most relevant environmental issues of the industry according to interviews

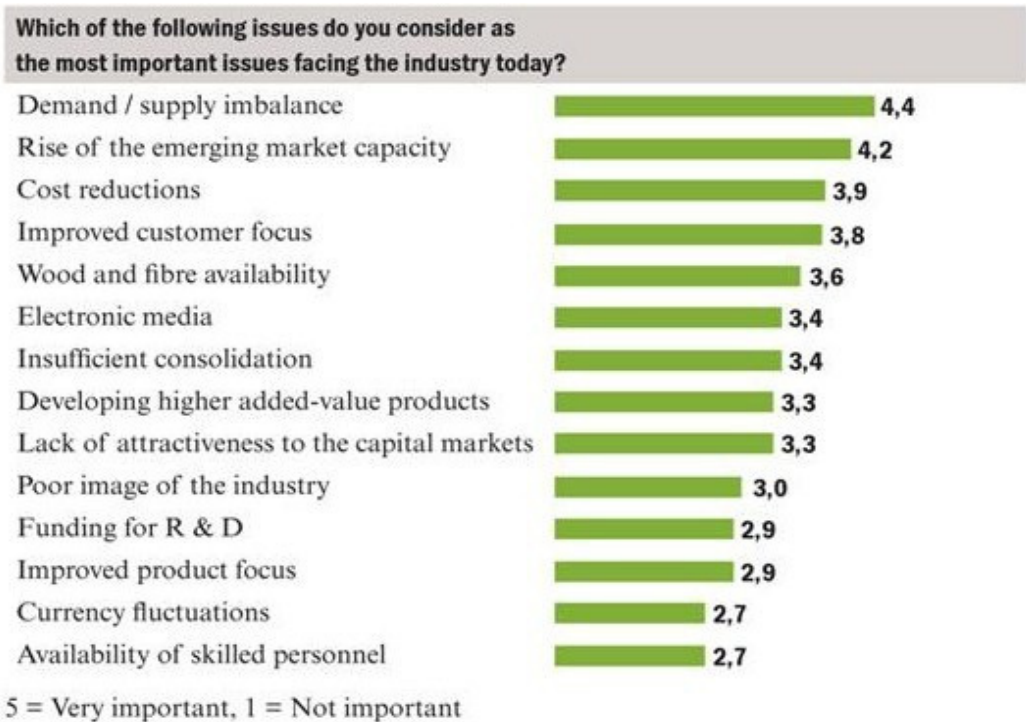
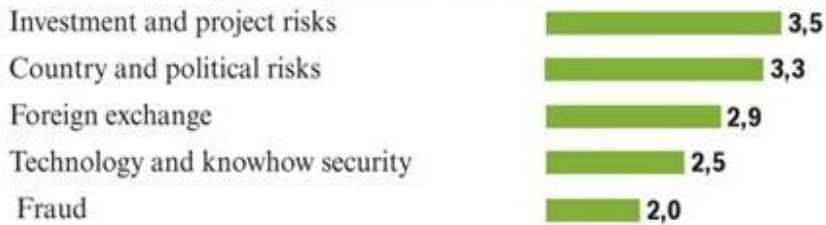


Figure 27: Biggest current challenges facing the industry according to the interviews

Which of the following risks do you consider the most important for the industry?



5 = Very significant, 1 = No risk

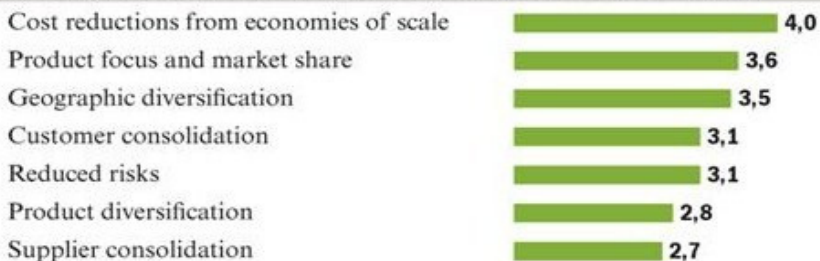
Figure 28: Most significant risk issues facing the industry according to the interviews

Currently the 10 biggest producers have a global market share of about 25%.

At what level do you anticipate this to be in 5 years?



What do you consider the most important drivers for increased consolidation?



1 = No importance, 5 = Very important

Figure 29: Development and drivers of industry consolidation according to the interviews

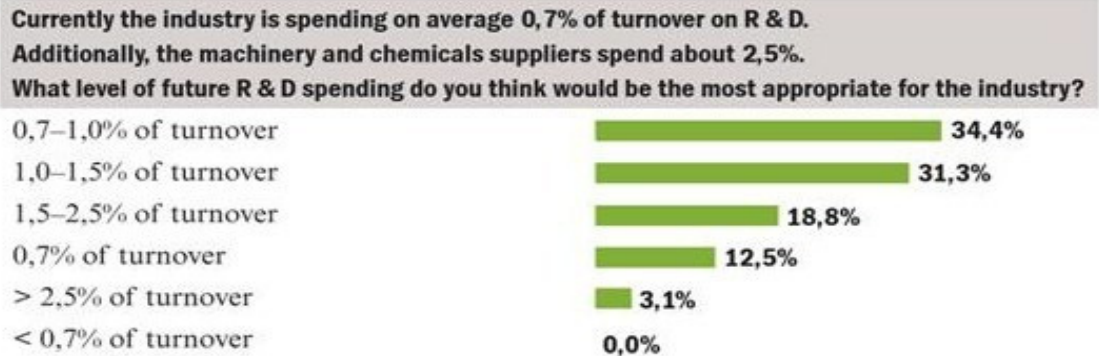


Figure 30: Development of industry R & D investments according to the interviews

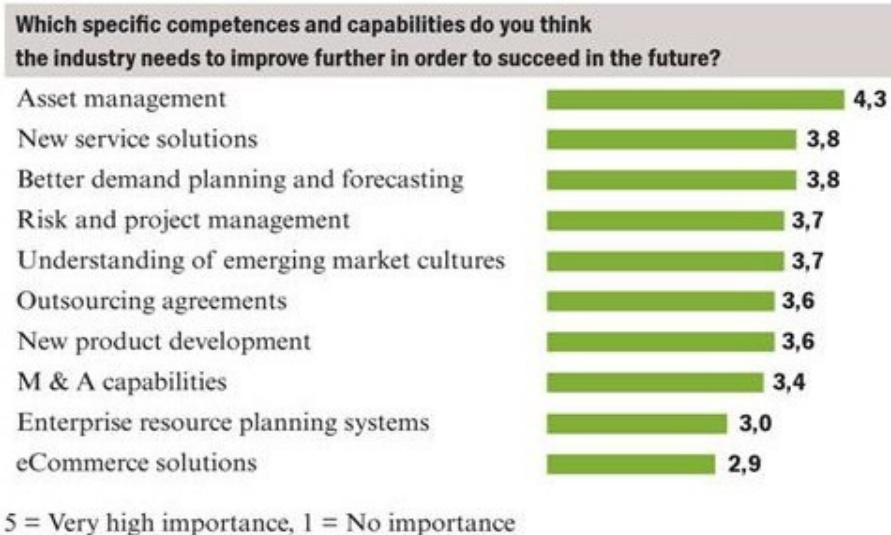


Figure 31: Most important future capabilities of the industry according to the interviews

9.3 Statistical analysis of the results

Figures 24 – 31 show the mean of each of the 36 responses to each of the 58 questions and the distribution of responses to the two multiple choice questions. For the sake of saving space, the standard deviations and 95 % confidence limits of each of the questions are shown in Appendix 2 – here the results are only briefly discussed.

As the sample size is relatively small, there is no need for a more thorough statistical analysis of the results. Mean of the responses to each of the questions, their standard deviations and 95 % confidence limits were considered to be sufficient. In case there are significant deviations – indicating that there are significantly differing views regarding a question, a deeper look at all the responses to a particular question was conducted.

The standard deviations of the responses ranged between 0.57 – 1.24 for the 58 questions asking a specific ranking of importance between 1 and 5. The mean of the standard deviations for all the questions is 0.97 and the mean answer of all the questions is 3.27. For the two multiple choice questions standard deviation is meaningless and instead only the distribution of the responses in percentages of total responses is shown.

In addition to standard deviations, 95 % confidence limits (calculated as ± 2 times standard deviation) were calculated and these are included in Appendix 2. There are several questions that have a high confidence limit – above 2.0 in a scale from 1-5 – indicating that the results for these questions have a low statistical confidence level.

However, a number of questions received relatively good confidence test results. It seems, that based on the 95 % confidence limit, not all the answers to the questions follow the normal distribution curve. It is necessary to study more in detail the questions that deviated more from the average standard deviation of 0.97 and confidence limit 1.96. The questions that received ± 10 % difference from the standard deviation average and confidence limits are listed in the following. It should be noted, that 95 % confidence limits are not usually calculated in business research due to the often relatively low sample of for instance interviews or case studies, which are often the main research methodology. However, for the sake of making the statistical analysis more robust, also these have been calculated.

Ten questions received a significantly (over 10 %) higher standard deviation than the average and a low confidence level based on the 95 % confidence limits:

1) Figure 29 – the role of economies of scale and cost reductions in industry consolidation: response mean 4.0, standard deviation 1.24 95 % confidence level 2.48.

- 2) Figure 24 – real –term prices continue to decrease over the next 5 years: response mean 3.4, standard deviation 1.17, 95 % confidence 2.34.
- 3) Figure 27 – the lack of attractiveness to the capital markets: 1.21 (mean of the responses 3.3), 95 % confidence limit 2.42.
- 4) Figure 27 - the poor image of the industry : 1.17 (mean of the responses 3.0), 95 % confidence limit 2.34.
- 5) Figure 27 – the funding for R & D: 1.17 (mean of the responses 2.9), 95 % confidence limit 2.34.
- 6) Figure 24 – electronic media increasingly displaces print media: 1.08 (response mean 2.9), 95 % confidence limit 2.16.
- 7) Figure 29 – product diversification as a driver for increased consolidation: 1.15 (response mean 2.79), 95 % confidence limit 2.30.
- 8) Figure 26 – availability of skilled personnel as an important challenge facing the industry: 1.07 (mean of the responses 2.68), 95 % confidence limit 2.14.
- 9) Figure 29 – supplier consolidation as a driver for increased consolidation: 1.08 (mean of the responses 2.66), 95 % confidence limit 2.16.
- 10) Figure 29 – geographic diversification as a driver for increased consolidation: 1.08 (mean of the responses 3.53), 95 % confidence limit 2.16.

The relatively high standard deviations of the above questions – above 30 % of the mean - simply mean that the respondents' views on these issues diverge more than most of the other issues. A deeper analysis of each individual response to above questions did not reveal any explanatory factors such as the country or respondent type. However, as the above issues quite complex (such as the importance of electronic media), it is understandable that the respondents have differing viewpoints. A total of 10 questions out of 60 can anyway be deemed as statistically less reliable.

A number of questions received statistically more reliable results – 10 % lower than standard deviation average of 0,97 - than others. These are listed in the following.

- 1) Figure 25 – low growth in Western Europe in the next 5 years: 0,56 (mean of the responses 1.6), 95 % confidence limit 1.12.
- 2) Figure 25 – low growth in North America in the next 5 years: 0.57 (mean of the responses 1.29), 95 % confidence limit 1.14.

- 3) Figure 25 – high growth in China in the next 5 years: 0.65 (mean of the responses 4.61), 95 % confidence limit 1.30.
- 4) Figure 25 – high growth in Eastern Europe in the next 5 years: 0.73 (mean of the responses 3.06), 95 % confidence limit 1.46.
- 5) Figure 26 – low growth in Rest of the World in the next 5 years: 0.81 (mean of the responses 2.40), 95 % confidence limit 1,62.
- 6) Figure 27 – demand and supply imbalance as an important issue: 0.87 (mean of the responses 4.34), 95 % confidence limit 1.74.
- 7) Figure 27 – currency fluctuations as an important issue: 0.85 (mean of the responses 3.14), 95 % confidence limit 1.70.
- 8) Figure 31 – asset management as a future competence area: 0.84 (mean of the responses 4.29), 95 % confidence limit 1.68.
- 9) Figure 29 – product focus and market share as a driver of consolidation: 0.85 (mean of the responses 3.60), 95 % confidence limit 1.70.
- 10) Figure 29 – customer consolidation as a driver of consolidation: 0.85 (mean of the responses 3.14), 95 % confidence limit 1.70.

The responses to the geographical distribution of growth seem to be the most reliable of the questions asked, with the lowest standard deviations and 95 % confidence levels. Demand and supply imbalance, the importance of asset management and product focus and market share as a driver of consolidation also received the statistically most reliable results.

The questions that were asked more than once – regarding consolidation, emerging markets, R & D, electronic media and new product development – and which also had the role of test questions – revealed inconsistencies with regard to R & D funding. R & D funding received relatively low scores (2.9) for importance under business challenges and risks section, whereas when asked specifically under industry future it received a great deal of attention with most respondents willing to substantially increase its funding. The other questions received very consistent responses when asked more than once. To a large extent this validates the reliability of the results.

Altogether 10 questions out of 60 seem to be statistically less reliable, with significant standard deviations and low confidence levels. The responses to these questions indicate, that due to the sample size of 36 and the complexity of the questions asked, views of the interviewees diverged significantly and the results for

these questions cannot be characterized as statistically reliable or normally distributed. The small sample size of 36 respondents is the main reason for the deviations – however, the sample size and also both the confidence levels and standard deviations are typical for previous doctoral research as outlined in section 2.7.

For 50 of the 60 questions the results seem to be statistically consistent and reasonably reliable and in – line with similar surveys and previous doctoral studies using this type of methodology. In many very significant issues such as the role of supply and demand balance, rise of the emerging markets capacity and the importance of cost reductions the results were very consistent with mean responses between 3.89 and 4.40 and standard deviation below 25 % of the response mean.

The results also indicate strong support for increasing R & D spending, although this was a multiple choice question and therefore no statistical analysis was carried out. Other notable results that can be considered statistically more reliable with low standard deviations and high 95 % confidence levels are asset management as a critical future competence area, product focus and market share as a driver of consolidation and the overall geographical distribution of growth over the next 5 years.

It should also be noted, that several questions received high response means – above 3.5 – such as Kyoto and carbon trading as environmental challenges, cost reductions and economies of scale as a driver of consolidation, new service solutions as a future competence areas and increasing consolidation over the next 5 years. However, their statistical reliability is slightly lower than the issues listed above as the statistically most important findings.

9.4 Main conclusions from the results

The conclusions of the results according to the three different categories are discussed in the following.

9.4.1 Global trends and regional development

The global trends that the interviewees felt were most clear dealt with increasing energy costs, increasing consolidation and the growing capacity share of the emerging markets – receiving 3.7, 3.6 and 3.6 mean scores respectively. Similarly, decline of real-term prices received a reasonably high score of 3.4. Electronic media and use of wood for bioenergy were clearly not considered as significant as the above.

The trends of capacity increases regarding emerging markets and especially China received a great deal of attention. The respondents clearly do not believe in significant capacity growth in North America (score 1.3) and Western Europe (1.6). India, South America, Russia and Eastern Europe were also considered countries that would increase their capacity share. This is very much in line with market forecasts, but the range between the responses – 1.3 for North America and 4.6 for China – is somewhat surprising and shows a degree of pessimism currently prevailing in the ailing in the Western markets.

Carbon trading and Kyoto agreement on climate change is clearly considered the most relevant environmental issue facing the industry. Illegal logging and emissions caused by transportation both received mean scores of 3.7, followed by forest certification, increased recycling and biodiversity issues. This is not surprising, considering the consistent attention by the media and environmental activists on these issues over the past years. An interesting observation is, that all the environmental questions asked received scores of 3.0 or above – whereas many other questions under other sections received scores of lower than that. Perhaps this is an indication, that environmental issues continue to be high on the agenda of the industry.

9.4.2 Industry challenges and business risks

Clearly the biggest concern for the industry and its suppliers and customers is the supply and demand imbalance, which has plagued most paper grades for several years now – especially in North America and Europe.

Interestingly, this question also had a low standard deviation even though also parties with differing interests and representing differing regions participated in the survey. For instance, although it might be in the interest of the publishing industry and merchants to maintain overcapacity in order to pressure paper producers, there is no evidence in the results of that. However, the sample size of printers, publishers and merchants was only 10, so this conclusion cannot really be generalized to apply to these sectors overall. But this survey does not offer any support for this.

Linked to the overcapacity concerns, the increase of emerging market capacity was considered as the second most important concern for the industry. Interestingly, the results did not show a significant regional variation in this – one might consider that for instance the Chinese producers do not consider increasing capacity a problem. However, the interviews offered no evidence of that – it seems, that overinvestments are a concern also to the emerging market producers, which is understandable as they are mostly domestic producers and hence big capacity increases hurt their business as well. Overcapacity seems to be a major concern also globally.

Related to the issue of supply and demand imbalance is the relatively high importance attributed to cost reductions. This has been an on-going theme for most pulp and paper companies for many years now. However, it is not perceived to be as important as balancing demand and supply and it received somewhat lower scores. This seems to indicate, that the interviewees felt that cost reductions alone - without balancing demand and supply would not be sufficient to improve profitability.

Improved customer focus was considered almost as important as the importance of cost reductions, receiving a score of 3.8 vs 3.9 for cost reductions. Again, although there were 20 industry participants and 10 customer participants and therefore there might be bias, review of the individual responses did not show significant differences between these groups. However, this conclusion cannot be generalized to apply across all the different sectors due to the relatively low sample size.

Challenges that are also considered relatively important – receiving importance scores of 3.6 and 3.4 are wood and fiber availability and electronic media, respectively. The results can be interpreted to mean, that these issues need to be closely monitored and they are important, but are not deemed to be of critical importance to the industry. The results regarding wood and fiber availability need to be considered also bearing in mind the timing of the surveys - in 2007 Russia had not yet announced its plans for substantial increases in export tariffs for wood, which has a big impact for the industry in Finland, Sweden and China.

It is possible, that if the survey had been carried out in 2008 or 2009, the scores could have been somewhat higher. Electronic media, on the other hand, is relevant mostly to graphic papers and this somewhat dilutes the results.

Industry consolidation received a somewhat surprisingly low priority as an issue for the industry – a score of 3.4. This is clearly below of for instance supply and demand balance and cost reductions. This indicates, that the fragmented nature of the industry – as discussed in chapter 6 – is not perceived to be the main cause of industry's low profitability. Considering that consolidation has been widely discussed in the trade press and in various conferences for many years, the interviews do not support the idea that increased consolidation would be crucial for improved profitability.

Developing higher added-value products did not receive a very high priority ranking either – only 3.3 and roughly at the same level as attractiveness to capital markets or the industry's poor image. This does not mean that the respondents feel that new product development should be ignored or that it is not important. It should be interpreted so, that there are other more important and critical issues that need to be addressed first.

The questions that received scores of below 3 – R & D funding, currency fluctuations, improved product focus and availability of skilled personnel – are not considered critical factors by the interviewees. As mentioned earlier, availability of skilled personnel had a clearly higher standard deviation than the average deviation and a number of interviewees rated it as more important than the mean score of 2.7.

The results regarding the most relevant business risks are quite clear, with investment and project related risks receiving the highest scores. Considering the capital intensiveness of the industry and the challenges of successful program management presented in Figure 19 in section 7.2, this is quite understandable. Somewhat lower priority of 3.3 was assigned to country and political risks. Foreign exchange, intellectual property and fraud related issues were clearly below those of above.

Foreign exchange rate related issues were in fact asked twice – firstly as an important challenge for the industry and secondly as a risk factor in the context of volatility. In both cases this was not rated especially important – with scores below 3.0. This is somewhat surprising, since one of the key currencies for the industry is the US dollar, which has been very weak against the Euro and Canadian dollar for many years now.

This has had a significant impact on the competitiveness of European producers especially in the overseas markets. It seems, that most interviewees take the view, that currency issues are beyond their control apart from hedging operations and as business managers they focus on risks and issues that they can control and manage.

9.4.3 Industry future

Consolidation of the industry was asked from several different perspectives from the interviewees. In the section regarding industry future, the clear majority or 62 % expected the current 25 % global market share of the 10 biggest producers to increase to 30 % over the next 5 years. A more rapid increase of consolidation to 40 % was expected by 29 % of the respondents. Total 91 % of the respondents therefore predicted either modest or significant consolidation to take place in the next 5 years, with the clear majority anticipating a fairly modest increase. This is in line with the other questions concerning consolidation, where continued consolidation was viewed as important but not one of the most critical issues facing the industry.

The interviewees were also asked about what are the drivers for increased consolidation, and very clearly economies of scale for reducing costs was considered the most important motivation behind this, with a mean score of 4.0. Product focus and market share followed by geographic diversification were considered the next two most important drivers with scores of 3.6 and 3.5, respectively. On the other hand, supplier consolidation and product diversification were deemed as the factors that did

not seem to have a major significance in consolidation. It should be noted, that all the above factors were ranked and given an answer – therefore, the different factors are not mutually exclusive and consolidation is to varying degrees driven by all of the factors mentioned.

R & D funding was another issue that was asked more than once, and in the previous sections it was not considered a major challenge or an issue, receiving relatively low or average scores. However, when asked specifically about the appropriate level of funding 34.4 % of the respondents would increase it significantly – from current 0.7 % of turnover to 0.7 – 1.0 % of turnover. Almost as many or 31.3 % of interviewees would increase it even more – from 0.7 % of turnover to 1.0 – 1.5 %, representing an increase of between 50 – 100 %. A significant percentage of interviewees or 18.8 % would increase the R & D spending even more – to a level between 1.5 – 2.5 % of turnover, whereas 15.6 % would either maintain or reduce current funding for R &D.

The results regarding R & D funding are interesting: 84.5 % of the interviewees wanted substantial increases in the industry's R & D spending. Although the sample included also machinery and chemicals suppliers, who currently spend on average 2.5 % of their turnover in pulp and paper industry R & D, their responses were in line with the overall results and did not reveal any bias. Only one of the 36 interviewees was at the time responsible for technology and R & D. An overwhelming majority of the respondents is clearly concerned about the funding and resources for R & D, and this concern was clearly expressed by some interviewees as comments during the interviews as well as in subsequent discussions with senior management of the industry when presenting the survey results. The results support the view, that the industry's management is willing to invest more in R & D and is concerned about research and development.

A number of questions regarding the industry's future competences and capabilities in need of further improvement were asked from the interviewees. Altogether 10 possible development areas were identified and the respondents were asked to rank them according to importance.

Asset management – referring to industrial assets rather than financial assets – was considered clearly the most important competence and capability, scoring 4.3. Issues such as new service solutions for customers and improved demand planning and forecasting also received relatively high scores of 3.8 each. These were quite evenly followed by better risk and project management, emerging market cultures, outsourcing agreements and new product development with scores between 3.6 and 3.7. Mergers and acquisitions capabilities, enterprise resource planning and eCommerce solutions received the lowest scores.

Due to the capital intensiveness of the industry, it is understandable that asset management and risks and project management receive high scores. However, also issues that are related to customers such as new service solutions and better demand planning and forecasting received high scores. It should be noted, that the results cannot be interpreted in such a way that the industry is currently performing any of these tasks well or poorly or that they are in need of urgent development – the results simply indicate the relative importance of each of above for the future success of the pulp and paper industry.

9.5 Comments during the interviews and presentation of the results

During the interviews, the interviewees were asked to provide any additional comments on a confidential basis. Specifically, they were asked if there are any additional issues regarding the current challenges and future of the pulp and paper industry. The reason for this was to gain more insights in addition to the questions asked. Most of the interviewees declined to do this, preferring either to remain completely anonymous or they felt they had nothing to add.

However, altogether 8 interviewees wished to make additional comments and these provide interesting additional insights to the concerns of the senior management of the industry and its stakeholders. These are listed below:

1. “Strategic thinking should now be the number one priority for industry leaders”
- A senior industry executive
2. “ Sustainable profitability improvement can only be achieved by controlling supply.” - An analyst
3. “More cross-cultural M & A skills and understanding are needed” – A senior industry executive.
4. “Everybody is in the same boat – paper and board producers, printing and converting machinery suppliers and brand owners. Deeper cooperation is needed.”
- A senior executive of a printing company
5. “Strong increase in R & D is a MUST!” – A senior industry executive.
6. “ It is necessary to learn from other industries – for instance “services” from the automotive industries or “project management” from chemical industries. The pulp and paper industry needs to be renewed. “ – A senior executive of a paper machinery supplier.

7. "The entire industry needs to rethink the overall strategy". – A senior pulp and paper industry executive.

8. "Chinese paper is beginning to enter European and North American markets" – A senior executive of a pulp and paper company.

The above comments reflect a genuine concern felt by the respondents regarding the future and current state of the industry.

The results of the interviews were then also presented to and discussed with senior management of the companies listed in section 9.1. These included also some of the interviewees of the companies and other members of their management teams. Typically the participants' responsibilities and background consisted of business development, corporate finance, strategic planning and division heads.

The results and the methodology was neither challenged nor criticized during the discussions. A number of issues raised questions and discussions – these were related to R & D funding, wood and fiber availability and carbon trading.

Specifically, two executives felt that the challenge in R & D is not funding or resources, but rather the lack of new ideas for development. Three companies were surprised, that wood and fiber availability was not considered an issue, and questioned the viability of the result. Carbon trading was confirmed as the biggest environmental challenge the industry faces by most of the companies and considered an additional burden for the industry.

The presentation of the results in the above-mentioned meetings basically confirmed the main findings and this adds to the reliability of the research. However, it must be noted that it was not possible to arrange similar meetings with all the participating companies and therefore it cannot be concluded that all participating companies concur with all the findings. However, the statistical analysis of the results indicated an acceptable level of standard deviation for all 60 questions with the exception of the six that were discussed earlier – this means that the results are overall quite well in line with the views of the interviewees.

10 STRATEGY CONSIDERATIONS FOR THE INDUSTRY

This chapter evaluates the business strategy that the industry overall has followed and summarizes the key changes underway and their implications for corporate strategy of individual companies.

10.1 Historical perspectives on pulp and paper industry strategy

Historically, the evolution of the industry has mainly been driven by the following factors:

- (1) Economic use of the available raw material – wood and later on increasingly recycled fiber.
- (2) High capital intensity, resulting in emphasis of efficient production, technology and investments.
- (3) Continuing market growth and increased consumption of paper and board.
- (4) Fragmentation – with many small companies competing with each other and leading to gradually higher degrees of consolidation.
- (5) Low level of internationalization, with companies mainly focused on exports and some production units abroad but within the home region.
- (6) Development of new technology left to the machinery and chemicals suppliers and subsequent weak proprietary protection of new technology.
- (7) Companies also received significant government subsidies – both directly and indirectly as a result of currency devaluations.

The above factors were valid for the period 1950 – 1990. As a result the evolution of the industry as a whole in Europe and North America, most of the biggest companies have in the past followed the following strategies:

- (1) Cost efficiency of production and economies of scale through investments and improvements in process technology. Organization structures reflected the importance of costs and efficient management of the assets and therefore mills typically had full profit accountability.
- (2) Full utilization of the available forest resources, resulting in also saw milling and the mechanical forest industry operations and a wide range of products in order to

fully optimize all the different wood species and sizes in the forest. It should be noted, that most pulp and paper companies have their origins in saw milling and chemical forest industry was developed later, but mainly due to above reasons the pulp and paper companies retain their saw milling operations.

(3) Dependence on exports due to small home markets and sizable production capacity combined with huge national significance in the Nordic countries often led to devaluation of the national currency – thus temporarily fixing any competitiveness problems. The era of devaluations in Finland came to an end in mid 90's when Finland joined the Euro – by that time bigger national interests were at stake and for instance the telecommunications industry had surpassed forest industry in terms of national importance.

(4) Growth was mainly organic, with relatively little M & A activity until early 1990's when the industry began to consolidate more intensively. One of the drivers for forming bigger and financially stronger entities was the overall pursuit of economies of scale and the high capital costs associated with new investments into bigger production lines. The speed of consolidation can be illustrated by the fact that of the top ten global companies in 1990 only three retained their name in 2005 (Diesen 2007). However, the degree of consolidation remains below that of many other industries today.

(5) Increasing use and availability of recycled fiber in Europe and North America had significant implications for production location issues. This meant that it was no longer necessary to base the production in the proximity of the virgin fiber sources and therefore in remote locations such as Eastern Finland, Northern Sweden or the Pacific Northwest. Instead, in many grades such as newsprint, capacity could be built close to the customers where the recycled fiber sources were available and logistics costs could be optimized. Competitive advantage shifted increasingly to the producers closer to the customers.

There are of course exceptions to the above evolutionary path – and some individual companies for instance in tissue have adopted different approaches. But for most companies, raw material availability, production efficiency and growth through capacity increases and a wide range of products have been the key features of their past development until 1990's.

The development of the industry changed during 1990's. Big investments for instance in fine papers led to overcapacity in Europe, companies began to merge instead of investing, size of the companies increased meaning increased resources for internationalization and organizationally individual, previously profit accountable mills were bundled into divisions which bore the actual profit accountability.

Generally speaking, this was a time of active growth and development throughout the industry. However, it seems now with hindsight that at the same time the industry failed to pay enough attention to certain weak signals such as the impact of the internet, emergence of Asia and the rapid build-up of eucalyptus plantations on the future of the business. Important developments in this time were the establishment of Celbi in Portugal and Aracruz in Brazil, both based on eucalyptus plantations.

The relatively prosperous and optimistic era of the 90's ended in the early 2000's and since then pulp and paper industry has been struggling with low profitability, supply and demand imbalance, mature markets and increasing costs for many production inputs. As a result companies have focused on restructuring, cost reductions, capacity closures and divestments of non-core assets as well as increasing interest in the emerging markets.

As a result of the restructuring process, many companies started also to become more focused and streamlined their business portfolio. The transformation of the business portfolio between 1995 and 2008 of a number of leading pulp and paper companies is listed in the following.

(1) International Paper. In 1995 International Paper had a wide product portfolio, consisting of market pulp, wood products, consumer packaging, coated and uncoated fine papers and coated mechanical papers as well as sizeable merchandising business, with operations in United States, Europe and Brazil. As a result of the Transformation Plan initiated in 2005, the company has now refocused itself and most of the company turnover now comes from uncoated woodfree papers and packaging boards – mainly office papers, paperboards and containerboards. It has divested its timberlands and coated printing paper businesses and is expanding in Russia and China, and the company turnover has increased from 19 B USD in 2005 to 25 B USD in 2008 (International Paper annual reports 1995 – 2008).

(2) Weyerhaeuser has undergone significant changes in its business focus between 1995 and 2008. In 1995 the company produced market pulp, fine papers, containerboard and building products. In 2007 it divested the fine paper business to Domtar and in 2008 the containerboard business to International Paper.

Nowadays the company focuses only on market pulp, building products and timberlands, and its turnover has changed from 21 billion USD in 2005 to 10 billion USD in 2008 as a result of above changes. (Weyerhaeuser annual reports 1995 – 2008).

(3) Metsäliitto Group has also undergone significant changes in its business portfolio. In 1995 the company focused on wood procurement, market pulp, sawn goods and wood-based panels, tissue, paperboard, containerboard, coated mechanicals, uncoated

fine papers and coated fine papers. Between 1995 and 2000 the company expanded rapidly into fine papers through acquisitions, which it has then between 2005 – 2009 divested. The turnover of the company has decreased from 8,6 billion EUR in 2004 to 6,4 billion EUR in 2008. Nowadays the company mainly produces market pulp, wood products, tissue, paperboard and office papers (Metsäliitto annual reports 1995-2008).

(4) In 1995 UPM-Kymmene was called Yhtyneet Paperitehtaat Oy until the merger with Kymmene Oy in 1997. UPM-Kymmene has transformed itself from being a part of a conglomerate producing machinery, packaging and pulp and paper – Repola Corporation – in 1995 into a pure forest products company. In 1995 the business focus of UPM consisted of market pulp, newsprint, magazine papers, fine papers, packaging materials and wood products. It is still involved with the above products and its turnover has remained stable (sales in 2005 9,3 B EUR and in 2008 9,5 B EUR). But the company has established operations in United States, China and Uruguay and it has recently reorganized into three business areas consisting of energy and pulp, paper and engineered materials (UPM annual reports 1995 – 2008).

There have been similar but perhaps less drastic business focus changes in many other companies as well. The clear trend is towards sharper business focus instead of growth through big mergers that perhaps characterized the industry in the 1990's.

10.2. Adapting to the strategic requirements of the future

Based on the research conducted in this study, the financial results of recent years and the survey results presented in chapter 9, the pulp and paper industry needs to adapt to the changes in the competitive arena and the global markets. In other words, it seems that the previous critical success factors of the industry and the dominant beliefs that have influenced the strategies of individual firms are no longer valid. The industry needs to – if not “reinvent” – at least renew its strategic thinking.

The most important of these changes are the following:

(1) The markets in North America and Western Europe in most paper and board grades are no longer growing at the same pace or faster than GDP. Organic growth through investments is therefore severely limited, and between 2000 - 2008 the industry has actually contracted.

(2) Growth through mergers and acquisitions in North America and Western Europe is also likely to be more difficult than during the 1990's and early 2000's. The reasons for this are the relatively high degrees of consolidation within individual product groups and subsequent restrictions by the competition authorities as well as low profitability making access to capital more difficult.

(3) Consolidation – long considered as vital and inevitable in the industry – is no longer believed to be the key to better profitability. The benefits of already high consolidation degree within certain paper grades in North America and Europe have yet to be fully realized through for instance substantial price increases. The interviews that were conducted and the results presented in chapter 9 indicate, that consolidation is important and it is likely to continue, but there were other issues that were considered clearly more important. Most interviewees predicted a relatively modest increase in consolidation in 5 years time – the capacity share of the top 10 producers increasing from 25 % to 30 %. It is doubtful whether this level of increase would bring the expected benefits from consolidation.

(4) Company size and economies of scale (except in production) can also be at least to some extent questioned. During the 80's and 90's growth and size seemed to be the prevailing paradigm for the management of many companies in this industry. One of the reasons for this was the capital intensity and the risks associated with heavy investments. However, after a certain critical mass is reached, there is no further need to justify growth in size only on the basis of investment risks. Many medium-sized firms such as Myllykoski, Portucel-Soporcel and Holmen have successfully invested in new paper machines.

There is no conclusive evidence that higher market share automatically leads to better profitability, as discussed in section 2.5. It is possible, if higher market share leads to lower costs or higher prices. Comparing the financial results of the leading pulp and paper companies in section 4.3, there is certainly no correlation between size and financial performance in the pulp and paper industry. There are many smaller and medium-sized companies that have performed better than the 10 biggest companies during 2003 – 2008.

(5) The performance of the paper value chain raises also some interesting strategy-related questions. Very few of the 10 biggest pulp and paper companies have a focused strategy – with the exception of Kimberly-Clark, all the others are involved with at least three separate business areas that have relatively limited synergies between them – for instance, between tissue and containerboard or fine papers and newsprint.

Furthermore, most of the big producers are positioned in the middle of the paper value chain, as shown in Figure 15. Some have previously pursued a forward integration path through acquisition of paper merchants or corrugated box plants – a number have since withdrawn from merchanting business. The financial performance of the different value chain participants shows, that the beginning and the end of the chain perform better than the paper and board producers – who seem to be “stuck in the middle”. This raises the question of whether current positioning and the business portfolio strategy – as outlined in section 2.2. on Porter's theory – is the optimal one

for many companies. Obviously, changing the current positioning within a value chain is very challenging and would certainly require completely new thinking.

(6) During the past five years, the industry has focused heavily on turnaround management: cost reductions and closing unprofitable capacity. This has been necessary and most likely will need to be continued. However, as presented in chapter 8 and outlined also in the results of the survey on turnaround cases, these are often not successful.

There are obvious limits to what can be achieved through cost reductions. Variable costs form the major part of the cost structure of a typical paper or board mill. Theories on business turnaround indicate, that change has to be managed holistically and take into account also the so-called “soft factors”. Sooner or later the industry will have to shift the focus from costs more towards added-value.

(6) Research and development, its funding and organization has during the past 3 years or so moved to the forefront of the agenda, as is clearly evident by for instance the European forest –based industries technology platforms and the recently published R & D strategy of the Finnish forest industry cluster strategy. The importance of R & D funding was also clearly highlighted in chapter 9 presenting the results of the industry interviews. To a large extent the industry has in the past outsourced R & D to its suppliers and different research consortiums, with the aim of minimizing spending.

Consequently, companies in both Europe and North America are now actively developing biofuel refineries together with the oil industry. Other new products being developed are different nanotechnologies for pulp and smart packaging.

However, as was presented in sections 2.4 and 3.8, the bulk of the industry’s output is based on commoditized products at the end of their life-cycle. Breaking away from this requires either entirely new products or re-engineered business models. New product development process in this industry is very time –consuming and requires extensive production-scale piloting. Therefore, new products and innovations that can eventually replace the current commodity production are not likely to happen for many years. The industry will therefore have to ensure the competitiveness of its existing products against competition from for instance electronic media, while at the same time actively develop entirely new products and businesses. Needless to say, this is very challenging.

(7) The leading players of the industry have for many years attempted to establish a solid presence in the emerging markets – especially Brazil, Russia and China. So far the progress has been slow and these markets generate only between 10-20 % of the total turnover. There are many reasons for this: these markets are challenging and

require a long-term perspective, there has perhaps been a shortage of suitable acquisition targets and the risks are high. Hence, the industry has preferred to follow the slower but more secure path of local joint ventures to build greenfield capacity.

However, the main motivation for entering these markets should be growth, rather than lower costs. The production costs in these markets are not necessarily significantly lower than for instance in Europe – with the clear exception of hardwood pulp based on plantation wood, as shown in chapter 8. Companies that have rapid growth in the emerging markets as part of their strategy and base it on building new capacity with local partners or with the aim of shifting production to low cost countries, should most likely re-evaluate their strategy.

The pulp and paper industry in North America and Western Europe is faced with new challenges and the old industry paradigms of size, growth, consolidation, wide product focus, value chain position, outsourced R & D and building new capacity in emerging markets are most likely no longer valid in the new situation. New strategic thinking and ideas are needed.

10.3. Renewal of the industry's strategy

Some of the issues that have been the driving forces of the pulp and paper industry were questioned in the previous section. The results of the interviews and the comments that industry executives presented – as discussed in chapter 9 – indicate that there is a wide consensus in the industry that new thinking is needed.

It is obviously up to individual companies to decide for themselves whether they need to re-evaluate their strategy and whether the arguments presented in section 10.2 are valid for them. It is beyond the scope of this research to present any industry-wide grandiose visions. However, certain conclusions based on previous discussion and interview results can be drawn.

These are briefly discussed in the following:

(1) It seems, that none of the issues discussed previously – consolidation, cost reductions, new product development and growth markets – are going to be sufficient on their own to transform the industry from present crisis into good profitability. All of these take many years before they have a major impact and they all present considerable management challenges.

(2) North America and Western Europe have shifted into a low or even in some paper grades a declining growth path. This means, that companies operating in these markets will have to defend their competitiveness against each other, substitution and importing countries such as China, Russia and Indonesia. Cost competitiveness will become even more important and turnaround management – closing uncompetitive

capacity and constantly developing the competitiveness of all operations – will become a key management competence in the future.

Successful turnaround management requires different leadership skills than traditional management. According to this research, it is far more challenging to turn an unprofitable crisis unit into a one with a sustained and healthy profitability than to manage a business that already is performing well. Most of these programs fail.

The critical success factors are a solid platform consisting of a compelling vision or a business plan, realistic target setting and timetables, open communication and top management support.

Some of the tools of turnaround management consist of asset management, outsourcing arrangements, shared service centers and developing new service solutions – as shown by the results of the interviews in chapter 9 regarding future competences and chapter 7 regarding cost reductions and turnaround management.

(3) Companies will have to make difficult strategic choices in product portfolios and how they respond to the above mentioned issues. For instance, should a particular company in European fine paper segment focus on trying to consolidate the sector further or focus on developing entirely new products? Or perhaps try to do both, if it has the necessary financial resources? Should the biggest companies in North America that have the required financial resources try to expand as rapidly as possible in emerging markets and reduce their dependence on their declining home market as much as possible or focus on defending their home markets while intensively developing new products and services? Paper industry management faces increasingly these types of decisions in the future.

(4) Profitable growth will continue to be one of the strategic objectives of most companies – provided they survive the current crisis. Organic growth in Europe and North America will most likely focus on development of new products rather than investing in new capacity. Mergers and acquisitions are a possible avenue for growth also in mature markets, but the fastest route to growth is offered by the emerging markets – either through greenfield investments or – even faster - through mergers and acquisitions. M & A in emerging markets requires a different approach than transactions in the Western markets – understanding of cultures, reputation and sustainability issues, relationships, risk management, timetables, long-term commitment and local competition all need to be carefully considered.

(5) Some of the comments by the senior executives of the industry during the interviews are also worthy of wider consideration. These dealt with the importance of new strategic thinking, learning from other industries such as chemicals or automobile industry and the fact that also the customers and suppliers of the industry

are in the same boat and should cooperate deeper to preserve the competitiveness of the entire cluster. These could be sources of new ideas and business concepts, best practices used in other industries and product and service innovation.

The managerial and strategic implications are discussed further in the conclusions of the study.

11. CONCLUSIONS AND RECOMMENDATIONS

The main findings regarding the research questions and managerial implications for pulp and paper industry are discussed in this chapter. Limitations, reliability and validity as well as suggestions for further research are covered in chapter 12.

11.1 Main findings regarding the research questions

The main objective of the study was analysis of key structural and fundamental changes underway in the global pulp and paper industry, their main drivers and implications to companies' strategies. In particular, the following research questions were asked:

- (1) Why is the transformation of the industry necessary?
- (2) What are the underlying factors of industry's profitability?
- (3) What are the key drivers of the transformation process?
- (4) What role do cost efficiency, value chain positioning, consolidation, R & D and the emerging markets play in the transformation process?
- (5) What are the implications of the transformation process for the corporate strategies of individual companies?

11.1.1. Research question 1: Why is the transformation of the industry necessary?

The profitability of the industry especially in Western Europe and North America was found to be unsatisfactory for six consecutive years now. Although there are differences between individual companies, the ten biggest pulp and paper companies have averaged 4.7 % of earnings before interest and taxes during 2003 and 2008. Some of the biggest companies such as Abitibi-Bowater and Smurfit-Stone have been forced to file chapter 11 protection from their creditors during 2009.

The unsatisfactory profitability is widely reported in the business press, the statements made by the leading companies regarding their financial results and in their annual reports.

Most paper and board grades are in the mature phase of their life-cycle, with demand growing below that of the GDP. Demand of for instance newsprint has been actually declining in North America already several years, resulting in the closing of many paper machines.

Similarly, many paper machines in many paper grades have been closed in Europe during 2003 – 2008 due to poor profitability and lack of competitiveness, resulting in significant losses in employment.

As shown in the commoditization curve of Figure 13 and the discussion on the theory of product life-cycles, breaking away from the commodity position requires either an entirely new product to be developed or a new and different business model to radically reduce costs.

A further demonstration of the need for the industry to transform itself is the “Manifesto for competitiveness and employment” by the Confederation of European Paper Industries” quoted in section 1.1., stating that the industry is eager to discuss its current difficulties and structural problems with the European Commission. Results of the industry interviews also very clearly show the need for the industry to balance demand and supply, invest more in R & D and rethink its strategies.

Based on above, it can be confirmed that the industry needs to transform itself in order to return to healthy profitability and improve its competitiveness.

11.1.2. Research question 2: What are the underlying factors of industry’s profitability?

Based on the results of the industry interviews as presented in chapter 9, the issues that are most critical for the pulp and paper industry in order of importance are the following:

- (1) Demand and supply imbalance
- (2) Increase in the production capacity of the emerging markets – especially China.
- (3) Need to reduce costs
- (4) Need to invest more in research and development and develop new products

By far the most important factor is the supply and demand imbalance, which scored 4,4 on a scale of 1 (as not important) and 5 (extremely important).

Demand and supply imbalance was clearly expressed as the main concern of the industry. The situation varies somewhat between individual grades and the market, but for instance in European coated and uncoated fine papers, there currently exists an overcapacity of 25 % and 20 %, respectively (RISI, 2008).

As a result of the demand and supply imbalance, prices of all the main grades – newsprint, LWC, uncoated and coated woodfrees, NBSK, cartonboards and containerboards have been generally depressed as shown figures 18 and 19. Basically,

the nominal prices of all the above grades have fluctuated but stayed between the same range during 1992 and 2008. For instance, newsprint has varied between 400 EUR/ton and 600 EUR/ton. This means, that in real-terms the prices of all the main grades have declined significantly and the prices have not been able to cover rising costs of for instance energy, chemicals and transport.

The reasons for the supply and demand imbalance are the following:

- (1) Due to better production technology, the capacity of a new state-of-the-art paper machine or a pulp line has increased dramatically. A state-of-the-art pulp line in 1990 was able to produce 500 000 tons/a – today, the maximum capacity exceeds 1 million tons. This means, that any new mills result in a much bigger surge in capacity.
- (2) The need to constantly improve productivity – by ca 2-3 % / year as a result of debottlenecking and other measures also increases production capacity.
- (3) Traditionally, European producers have exported ca 30 % of their production and Canadian producers over 70 %. Mostly this is traded in USD terms, and as a result of the weak dollar for many consecutive years, this business has suffered. Therefore, companies try to minimize exports and focus on their domestic region, thereby increasing the supply and demand imbalance in the home markets.
- (4) Demand for most paper and board grades has grown sluggishly or even declined in Europe and North America, as shown in Figure 12. Market growth has been insufficient to melt the persistent overcapacity.
- (5) Capacity increases especially in China have led to diminished exporting opportunities in many traditional overseas markets, such as Middle-East and South East Asia, as well as China.
- (6) Due to the fragmented nature of the industry, there are many smaller family-owned producers that may have different financial targets and management philosophies than the bigger listed companies. For instance, cash-flow may be more important to them as a financial target than for instance return on capital employed or increasing stock prices. This means, that these companies will not easily go out of business and their production capacity does not disappear from the market.
- (7) Despite the fact, that the degree of consolidation is quite high within individual regions and products such as newsprint in Europe, this has not resulted in better investment discipline or capacity planning. Despite the severe overcapacity, some recent examples of investments in new capacity are decisions by Palm and Portucel-Soporcel – Palm in newsprint and Portucel-Soporcel in uncoated woodfree.

As a consequence of above, overcapacity has persisted despite significant closures of old and uncompetitive production and loss of employment of recent years. Therefore companies have been unable to sufficiently raise prices while production and service costs have increased.

In light of above discussion, supply and demand imbalance is the main factor contributing to the poor profitability of the industry in Western Europe and North America, leading to inability to raise prices to match the costs. Cost efficiency and its role and impact on profitability is discussed in detail in section 11.1.4.

11.1.3 Research question 3: What are the key drivers in the industry's transformation process ?

According to the discussion on research questions 1 and 2, poor profitability is the most significant driver of the need to transform the industry and the primary underlying reason for this is supply and demand imbalance. Supply and demand imbalance is also the main reason, why companies have not been able to transfer unit cost increases into paper and board prices. The reasons behind the supply and demand imbalance were presented in the previous section as well.

However, there are underlying factors behind the above-mentioned reasons for supply and demand imbalance, as well as other drivers that shape the structure of the industry. These are listed in the following:

- (1) Capital intensiveness of production and high level of working capital needed
- (2) The phase of the product life-cycle that most paper and board products are in.
- (3) The different phases of the global industry.
- (4) The role played by the substituting products.
- (5) Fragmented structure of the industry.
- (6) Availability and cost of fiber.
- (7) Position of the industry in the overall paper value chain.

Points 5 and 7 are discussed more in detail under research question 4.

Capital intensity of production has been discussed previously – a modern greenfield

pulp mill will today cost more than 1 billion USD. The technical life – span of the production assets is over 20 years, and in order to be competitive over the life-cycle and to maximize economies of scale companies maximize the production capacity of the new mills. This results in bigger surges of new capacity, which easily leads to overcapacity.

As shown in the value chain discussion in chapter 5, paper and board products have a long distribution chain to the ultimate consumer. Financing this ties up a lot of working capital, and the problem is exacerbated by the high negotiating power of the customers – which results in high service level, inventory and unfavourable payment terms.

As discussed in section 3.8 and presented in Figure 13, nearly all the main paper and board products are in the mature phase of the product life – cycle in Western Europe and North America. This is evident from the demand growth figures that are below average GDP growth of the economy, which is a clear sign of a maturing product or service. Eastern Europe and Asia grow much faster – but even in China the market growth of ca 6 % is below the growth rate of the total economy.

Paper and board are typically intermediate products, positioned in the middle of the value chain. As discussed in chapter 5 on the performance of the paper value chain, paper and board producers generate only 5 % of the total value creation from wood to the consumers.

This means, that the negotiating power of the consumers and customers has increased and shifted the power in the paper value chain towards the end, thereby intensifying the competition between the paper and board producers in line with Porter's theory as discussed under section 2.2. Typically, this results in a cost game, and companies will have to make choices – to stay in this business and strive for cost leadership or develop new products and services and try to differentiate themselves.

The urgency to develop new products was clearly evident in the results of the industry interviews: 84.5 % of the respondents wanted to increase the industry's R & D spending from current 0.7 % of turnover to a level of 0.7 % to 1.0 % of turnover or more. 53.2 % of the respondents wanted the industry increase its R & D spending to a level of above 1,0 % of turnover – an increase of over 50 % of current levels.

This represents a substantial increase and it manifests a clear desire by the industry, its suppliers and customers that new products and processes must be urgently developed. This is discussed in more detail under research question 4.

Another key transformation driver is the geographic development of the industry.

As shown in Figures 11 and 12 and discussed in chapter 3, market growth for paper and board has shifted to Eastern Europe, Russia and Asia and the Western markets

are mature and even declining in some grades. Local producers especially in China have invested aggressively to meet the rising demand. At the same time, fast-growth plantations of eucalyptus and acacia have enabled very cost efficient hardwood pulp capacity to be built in South America and Indonesia. Western companies still retain technology leadership through cooperation within the forest industry cluster.

This has forced a number of Western companies to shift their investment and M & A focus to outside of their home region and implement painful cost reduction and capacity closures in their home markets. The shift offers opportunities, but not without risks. Asset quality and competitiveness of the domestic capacity may deteriorate due to lack of investments, possibly leading to loss of the technological edge that especially Nordic companies still enjoy.

Shifts in economic power between the West and the East has additional implications besides rising capacity and demand in Asia. Due to the high economic growth of especially China and India and the increasingly scarce oil reserves, price of oil has increased and it is forecasted to increase in the long –term (ITEM Club, 2009). As a result, the costs for energy, transportation and certain oil-based chemicals have increased between 2003 and 2009.

This has forced companies to further reduce their costs, because they have unable to transfer the costs to customers due to the supply and demand imbalance.

Substituting products are also transforming the industry. Basically, demand for graphic papers is driven by advertising whereas board demand is linked to the overall industrial and economic development. The rapid growth of the electronic media and advertising has resulted in the loss of market share for the print media.

Fiber availability and its cost is another transformation driver. During the 1990's, recycled fiber became more widely available due to increases in recovery rates and environmental demands in Western Europe and North America. It has now become the dominant fiber source for many grades such as newsprint and containerboard. This has also meant, that paper and board production can be located near the main consumption areas and it is no longer necessary to locate production in remote areas close to the forests.

Another major change has been the utilization of fast-growth hardwood such as eucalyptus for hardwood pulp production – the focus of pulp investments has shifted to South East Asia and South America. Summary of the factors influencing industry profitability and the key drivers of the transformation process is shown in Table 18.

Table 18: Summary of the key transformation drivers and their impact on supply and demand and profitability

Transformation driver	Impact on supply / demand	Impact on profitability
Availability and cost of fiber		xxx
Capital intensity - Large capacity surges - High capital costs	xxx	xx
Different phases of the global industry - Emerging market capacity	xx	xxx
Low consolidation degree - Globally low - Regionally in some grades high	x	x
Product life-cycle - Commoditization - Cost game		xxx
Substitution - Electronic media - Plastics, other	xx	xx
Value chain position - Strong customer negotiating power		xx

Some comments regarding Table 18 are in the following:

(1) Fiber availability and cost does not have a significant impact on supply and demand – rather, this is an issue concerning the location of new capacity and wood supplies are a key determinant in this. In other words, new capacity will be built in a location where wood supply is guaranteed. On the other hand, cost and availability of fiber has a big impact on the profitability of existing capacity.

(2) Different phases of the industry and rise of the emerging markets has a big impact on global supply and demand and an even bigger impact on the profitability of the Western companies. This is due to the fact, that surplus capacity in Europe is increasingly difficult to export to overseas markets and the possibly increasing imports from emerging markets at low prices could upset the pricing in Europe. For instance, a mere 5 -10 % import share of office papers at 10-20 % lower prices could lead to significant price erosion in Europe.

(3) Product life cycle maturity and commoditization does not influence supply and demand, but it does have a significant impact on profitability – price becomes the most important purchasing criterion and cost efficiency is critical.

(4) Consolidation has a moderate impact on both supply and demand and profitability. Despite high degree of consolidation in for instance LWC and fine papers in Europe, companies have been unable to raise prices.

(5) Value chain positioning impacts only profitability, through strong negotiating power of customers and suppliers. By itself it most likely does not lead to capacity increases.

(6) Substitution leads to lower demand and therefore it has a significant impact on both supply and demand and profitability, especially for printing and writing papers.

11.1.4 Research question 4: What role do cost efficiency, value chain positioning, consolidation, R & D and emerging markets play in industry transformation?

Improving cost efficiency, changing the current value chain position, increasing level of consolidation, higher added-value through enhanced R & D and growth in the emerging markets are some of the most important strategic responses of the industry to adapt to the transformation processes. Their role and impact is discussed here.

As a result of the deteriorating profitability, companies have focused on cost reductions and launched several profit improvement programs. As discussed in chapter 7, cost reduction programs are not always successful and also the case studies on turnaround management indicated that only 5 of the 12 turnaround cases were successful. As shown in Figure 19 regarding the survey carried out by Ernst & Young, fewer than 1 out 3 cost reduction programs led to a sustained improvement in performance.

The cost structure of a typical paper or board mill consists mainly of variable costs, as shown in Table 6. Costs such as chemicals, transport or energy are not directly

under the control of the management – at least not in the short term. For instance, changing the variable costs may require investments in a new power plant and reducing the chemicals costs may need product modifications – these require time.

Some of the reasons why turnaround programs have been less than 100 % successful are the following:

- (1) The approach is not holistic and focuses too much only on personnel costs. Other important factors such as customer relations and product development are easily ignored.
- (2) A new strategy or a comprehensive business plan is not developed.
- (3) Timetables and targets are not realistic.
- (4) Communication is not comprehensive and open, leading to stiff resistance to change.
- (5) The turnaround leader and the team lacks the personal leadership qualities required in managing the change program.

According to the results from the industry cases, the managerial requirements between a normal, reasonably profitable business and a crisis unit in need of a turnaround process are drastically different. The need for performance improvement in a crisis unit can be as high as 30-40 % in many critical areas, whereas in a normal business unit continuous improvement and just good, basic management is sufficient.

Pulp and paper industry has been characterized as a typical, capital-intensive heavy industry. In this type of a culture, change, flexibility and embracing new ideas are not necessarily common. Both the management and labour unions seem to have accepted the “status-quo”, arguing that certain issues simply cannot be changed. Relations between the unions and management are in many countries strained – examples are Finland, France and Canada and the bitter labour disputes of the past few years. One example of that is outsourcing, the implementation of which is only now becoming more common in this industry – in many other heavy industries such as automotive or construction this has been used more widely for many years now.

All businesses need to continuously monitor their business environment for any disrupting changes, improve competitiveness and constantly develop new products and services. The competitive situation that the paper industry faces in North America and Western Europe highlights the need for this. The companies in industrialized countries need to continue to maintain or improve cost competitiveness

and reduce overcapacity in most of the paper and board grades and defend their position against substituting products and imports from other regions. In a sense, most paper and board mills in North America and Western Europe are going through a turnaround process – the main differences between individual units are related to the severity of the situation and how drastic actions are needed.

The role that cost efficiency plays and the means to develop it through turnaround programs can be characterized as defensive measures. Because of the cost structure of the industry – with variable costs in a dominant role – cost reductions can only to a certain extent improve profitability. They are necessary, but unless some breakthrough innovations in production processes and new materials can be found and thereby radical changes in the cost structures implemented, on their own cost reductions are unlikely to be enough to solve the industry's problems.

The pulp and paper industry value chain also plays an important role in the industry's transformation. As discussed in chapter 5 and presented in Figures 14 and 15, paper and board are intermediate products and the actual value creation takes place at the end of the chain near the ultimate consumer. Furthermore, the profitability of both the key suppliers and the customers of the industry has been significantly higher than in the paper industry.

While it is clear, that publishing and consumer goods are entirely different businesses than pulp and paper, paper and board producers generate only a small fraction of the total value at the consumer. This is despite the fact that both the printing surface and packaging are important attributes of the products that publishers and consumer goods companies sell to consumers.

For instance, a women's magazine such as Cosmopolitan or Elle needs a high quality glossy surface that can vividly bring to life both the advertisements and the pictures on fashion, food, travel etc.

Similarly, consumer goods producers must constantly fight for shelf-space in supermarkets and retail stores, and a high quality or a different packaging that stands out from other products is essential - a cartonboard or a containerboard that enables this in converting is therefore needed. Paper and board are part of the brand of both publications and the consumer brand – owners.

Besides being an essential component of the product offering to the consumer, paper and board producers play a critical role in the supply chain of publishers and consumer goods companies. Availability and reliability of supply as well as trouble-free performance in printing and packing are needed. If a newspaper cannot be delivered on a particular day or a dairy product such as milk is unavailable due to

shortage of newsprint or liquid packaging board, the results are reputation losses to the brand as well as lost revenues.

Therefore, the very low share of paper and board of the total value creation seems astonishing. If paper and board producers were able increase their share of the total from 5 % to only 6 %, this would translate into a price increase of 20 % and the industry's profitability would be significantly improved. This would of course require new marketing and service concepts, product innovation and there are obvious challenges involved. But the opportunity for this certainly exists, and also the customers – publishers and printers – have a vested interest in this: the entire value chain needs to join forces to defend the business against electronic media.

Many pulp and paper companies have tried to integrate forward in the value chain. Some companies have acquired merchanting operations and expanded into converting such as folding carton or corrugated board production. These have not improved the overall profitability and a number of companies have during the past 3 years exited for instance from merchanting. Most likely the reasons for this have been the need to sharpen the business portfolio and the fear of upsetting other customers.

The position of the paper industry in the overall value chain has the following impacts on the industry transformation:

- (1) Negotiating power has clearly shifted to the customers of the industry and its key suppliers, as is evident from profitability comparisons, inability to raise prices to cover costs and the relative value creation. Changing that is likely to be very difficult and at the very least this would require balancing demand with supply or development of new products and services.
- (2) Companies need to make strategic choices: whether to remain in the present middle position, move forward in the value chain for instance into converting or integrate backwards. For instance, Weyerhaeuser has exited the paper and containerboard businesses and is now focused on pulp, forestry and wood products.
- (3) Companies need to assess the opportunity offered by the total value of the paper and board chain and the current very low share of the industry. New products and services as well as marketing concepts offer the potential for increasing the industry's share for instance from 5 % to just 6 % of the total value creation. Companies need to balance this opportunity against the need to reduce costs in R & D, marketing and supply chain.

None of the above is easy and making fundamental changes in the position of individual companies is likely to be also quite time-consuming.

Industry consolidation has often been cited as a cure for the profitability problems. During the 1990's and early 2000's, there have been several waves of mergers and acquisitions and many well-known company names have disappeared from the list of top 20 companies during the past 10 years. Despite this - as discussed in chapter 6 - the share of the top 10 companies of the global capacity is still only 25 % , which is far below that of many other industries. Regionally and within specific grades, the situation is much more concentrated.

According to theory, this should lead to better capacity control, investment discipline and better pricing and hence improved profitability. But this has not happened – industry profitability remains poor in both North America and Europe. As shown in Figure 16, prices of some grades such as graphic papers have increased in North America, but the same trend has not taken place in Europe.

It should also be noted, that the prices in nominal terms (with the exception of newsprint) also in North America remain below their historical peaks of the early 90's, and in real-terms they have significantly declined. In the study by Pohjakallio (Pohjakallio, 2000) on the consolidation of North American paper and board markets between 1977 – 1998, results were inconclusive regarding improved pricing as a result of increased consolidation.

Increased consolidation does bring benefits to the industry, in terms of better capacity management, synergy benefits, market stability, increased negotiating power etc and possibly also pricing. It may be, that without a high degree of consolidation for instance in LWC in Europe, the pricing situation would be worse than currently is. But the evidence of improved profitability directly as a result of consolidation is so far missing.

The feasibility of increased consolidation is also questionable. In many grades, competition authorities will not allow market shares of above 30- 40 % for any single producer. Increasing the share of the top 10 players of global capacity from the current 25 % to 50 % would require substantial injections of capital, and the attractiveness of this industry to major financial investors such as private equity firms is most likely not sufficient to fund this. At 50 % and 10 companies, the industry would still remain relatively fragmented compared to many other industries.

This does not mean, that the industry should not continue to strive for increased consolidation. Most of the respondents of the industry interviews as presented in chapter 9 expected that consolidation will continue, but at a relatively modest rate with the global share of the top 10 companies increasing to 30 % in 5 years time.

Based on above, it is doubtful whether consolidation on its own is enough to improve the profitability. Consolidation is one important component, but other factors need to change as well to lead to a sustained and healthy profitability.

One of the factors that in addition to increased concentration contributes to the better profitability and on which the industry places great expectations is R & D and development of new products. This was clearly evident from the results of the industry interviews presented in chapter 9: over 80 % of the respondents wanted the industry to significantly increase its R & D expenditure.

The industry has in the past largely relied on its suppliers – paper machinery and chemicals – to develop more efficient production processes and improved products.

This also has a downside – the new technology is easily transferred to emerging markets such as China. European pulp and paper companies need to ensure that any jointly developed new technology remains proprietary.

Focus has been on increased productivity with ever-larger pulping lines and paper machines, reduced environmental impacts and incremental improvements in product quality. As a result, very few entirely new products have been developed – nearly all the major product groups of today have been developed over 20 years ago. The situation is similar to many other heavy industries, such as the automobile industry – the performance and fuel efficiency of cars have increased significantly, but the basic technology and product are essentially the same as 20 years ago, and hybrid or electric cars are only now becoming available for consumers.

As a result of the increased focus on R &D over the past few years, a number of interesting new product ideas have been developed. Biofuels and smart packaging are perhaps the most promising ones.

As shown in Figure 13 and the discussion on product life-cycle theory, most paper and board products are at the mature phase of their life-cycle and they have become commoditized. Breaking away from this position is very difficult and requires either the launch of entirely new products or re-engineering the business model to dramatically reduce the costs to serve.

The new product development process in a capital intensive industry such as pulp and paper is time-consuming and it often requires industrial-scale piloting before investments and commercialization can be started. It can be easily 10-20 years before a promising new idea is fully commercialized and developed into a sizable business. It seems, that the problem is not so much lack of funds or competent R & D personnel, but rather a shortage of good ideas.

Based on above, R & D and new product development is essential to the industry's long-term future – but while developing new and replacing products, the industry must ensure the competitiveness of its existing products and services.

This means that R & D efforts and close cooperation within the industry cluster – machinery and chemicals suppliers as well as the graphic industry – must be continued and intensified. However, although cluster cooperation is needed, the pulp and paper companies need to protect the intellectual property created by new innovations and prevent their transfer for instance to China.

The role that the emerging markets play in industry transformation is two-fold - on the one hand they offer great growth opportunities and in the case of hardwood pulp also significantly lower costs. Regional growth in these markets is a significant driver of the industry's globalization. On the other hand, there are major risks and challenges in entering these markets and the emerging market companies are emerging as major competitors to the Western firms – both within these markets and in the form of rising imports into the Western markets. High transportation costs and the service levels required by Western customers act to a certain extent as barriers to this. The rise of emerging market production capacity was cited as one of the main issues that impact the global pulp and paper industry in the industry interviews.

The conventional view of the industry's globalization process is, that due to lower production costs big Western companies shift the focus of their investments there and gradually also the bulk of their production to these countries. According to this research, there are several arguments against this view.

These are listed in the following:

- (1) As discussed in chapter 8, production costs are not significantly lower in the emerging markets – the exception being hardwood pulp in South America and Indonesia. China and India are reliant on imported fiber – mixed tropical hardwoods, logs, chips, recycled fiber and market pulp. Depending on the grade, these form 40-60 % of the production costs and they are traded at global market prices.
- (2) Energy – based on coal, crude oil or gas – and chemicals are also traded at global market prices.
- (3) Labour costs are significantly lower, but these represent only 10-12 % of the total costs. Western firms typically employ fewer employees than their local competitors in for instance China or Russia.
- (4) According to the survey by Ernst & Young outlined in Figure 10 of chapter 2 (Ernst & Young), over 60 % of companies in the study across different industries

cited growth as their main strategic objective when considering expansion in emerging markets. Only 12 % cited lower costs as their main motivation.

(5) There are several challenges and risks in both greenfield investments and M & A in the emerging markets. Some of these are the difficulties of obtaining reliable market and accounting data, shortage of facilitating infrastructure for M & A deals such as auditing, legal and financing, fraud and corruption as well as environmental concerns. These were discussed in detail in chapter 8.

(6) There is increasing competition for plantation wood – both by the local and Western companies and alternative uses for the land such as food production. As a result, big pulp and paper companies are actively exploring plantation opportunities in more and more exotic and challenging areas, such as sub-Saharan Africa and Papua New Guinea. Possible local conflicts with landless farmers and environmental organizations are increasingly also a reputation risk for these companies.

(7) Although Russia has the world's biggest coniferous wood reserves, accessing the wood has proved to be difficult due to lack of infrastructure and still unclear forest concession rules and legislation protecting investments. In 2007, three Finnish companies announced that they were investing in three new 1 million ton pulp mills in Russia – all of these plans have since then been cancelled or postponed.

As a result, most Western companies have selected a cautious expansion strategy in these markets, setting up joint ventures with local partners to build greenfield mills. This is a relatively slow growth strategy and it also adds to the global supply and demand imbalance. Despite expansion efforts by the biggest pulp and paper companies for the past 10 years, the share of total turnover generated by these markets is still between 10-20 % . More rapid growth would require major acquisitions in addition to greenfield investments.

Unless the Western companies change their strategy and shift the focus from joint ventures and greenfield investments to making major acquisitions – with the associated risks – the impact of the emerging markets on the Western companies' structure is not likely to be a major one for a long time. Especially China is expected to grow very rapidly and it is estimated to be the world's biggest market by 2020 – the bulk of this growth will be supplied by the domestic producers through greenfield investments and it is likely that China becomes a net exporter of paper and board.

In summary, the roles that the above factors play in industry transformation and as possible strategic responses by senior management to improve long- term profitability are the following:

(1) Cost efficiency and turnaround management are basically defensive factors, essential to maintaining the cost competitiveness of the maturing markets in the home regions of Western Europe and North America. While necessary and painful, due to the cost structure of the industry they will most likely on their own not be enough to ensure healthy profitability. Companies need to improve how they manage turnarounds of troubled business units.

(2) Value chain positioning and especially the low share of paper and board of the total value creation offers significant opportunities for improving profitability. Increasing the current ca 5 % share to for instance 6 % of total value created through new marketing concepts, R & D and new products and services would significantly improve the profitability of the industry. Companies must make a choice between staying in the current intermediate position and ensure cost competitiveness, drive for added-value or withdraw from paper and board and focus on for instance just pulp and mechanical forest products.

(3) Consolidation in the home regions and within specific grades may eventually fulfil its promise of better capacity management, investment discipline and improved pricing. At the moment there is no evidence of a direct link between consolidation and improved profitability, and there are both financial and regulatory limits to increased consolidation. However, the potential for gaining the benefits that are theoretically associated with consolidation exists, and therefore companies should continue to pursue this when possible.

(4) R & D and development of new products represent the hope of added-value and reversing the current commoditization process of paper and board. However, the new product development process in this industry is time-consuming and requires usually industrial scale piloting before the big investments required can be implemented.

The bulk of the turnover and volume of the industry will continue to be based on existing products, whose competitiveness against imports and substitution must also be maintained while developing entirely new products. This adds to the challenges of the R & D of the industry.

(5) The emerging markets play a dual role in the industry transformation process: they offer both risks and rewards. Emerging markets such as China, Russia, Brazil, India and Eastern Europe represent significant growth opportunities, but in order to capitalize on them companies should shift their focus from a cautious approach based on joint ventures and greenfield investments towards M & A. These are risky – as are greenfield investments – but they offer a faster route to these markets and towards changing the structure of individual companies.

There are also many other issues that drive the industry transformation. Energy and environmental issues are some of these. However, a detailed analysis of these is beyond the scope of this research.

11.2. Evaluation of the results and the research gap

As discussed in chapter 2 under section 2.6., there is surprisingly little previous research that is directly related to the research topic of this study. On a general level, there is a wealth of research on all the topics studied – strategy, turnaround management, new product development, globalization and consolidation.

Their application to pulp and paper industry, however, is relatively limited, mostly focused on the Finnish industry and carried out before the industry entered its present crisis. A comprehensive research focused on the crisis and the on-going transformation has been missing, and therefore it can be stated that a research gap has existed.

In more detail, the research gap consists of the following:

- (1) Analysis of the paper value chain, profitability of its different participants and its implications to the paper industry has not been publicly presented before. Individual companies may have carried out similar analysis either internally or by using consultants.
- (2) The challenges of turnaround management and its success rate in the paper industry through actual cases have not been publicly presented before.
- (3) Factors influencing the industry future have not been previously comprehensively studied using in-depth interviews of all the paper industry cluster participants.
- (4) A comprehensive analysis of the risks and rewards offered by the emerging markets and a critical assessment of the current entry strategies of the pulp and paper industry has previously been missing.
- (5) A comprehensive analysis of the factors driving the industry transformation has so far been missing.
- (6) The effectiveness of the different strategic responses available for industry management – such as improving cost efficiency, increasing consolidation, enhanced R & D, growth in emerging markets and changing the value chain positioning – have not been comprehensively studied before.

Additionally, the research challenges some of the common axioms and basic beliefs of the industry, such as the importance of size in relation to profitability, the lower production costs of the emerging markets and the importance and feasibility of industry consolidation.

Hopefully this research adds to the existing body of knowledge regarding the paper industry and generates a constructive debate that assists industry management in formulating and implementing strategies that lead to improved profitability.

11.3. Strategic implications for industry leaders

The on-going transformation of the industry and its business environment has significant implications for the senior executives of pulp and paper industry and its suppliers and customers. This is true especially for those executives in charge of strategic planning and business development.

This research has identified five possible strategic responses that are available for industry leaders to adapt to the transformation process: increasing cost efficiency, higher value creation, R & D and new product development, increased consolidation and growth in emerging markets. Each of these plays a different role and has a different potential in improving the future profitability of the industry. These are summarized in Table 19.

What seems to be common to these factors, is that they are all time-consuming, require financial resources and represent different management challenges. Managing a business turnaround of a particular business unit or a division is very different to that of nurturing new, unorthodox innovations or expanding through M & A in China or India. It seems likely, that all of these would need to be developed simultaneously over a longer period of time – any one of these is not likely to be enough on its own to return the industry to profitability.

Transformation from the for many years now a consistently low profitability into a healthy profitability would therefore require, that a particular pulp and paper company is able to improve and defend its competitiveness in its home region through cost reductions, closures, consolidation and turnaround management, develop new products and business concepts while investing in emerging markets. All of these actions require financial resources: write-downs and extraordinary items for mill closures and redundancies, increased R & D funding, M & A for consolidation and financing growth in emerging markets.

It seems very likely, that not even the strongest pulp and paper companies are in a financial position to carry out all of these : depending on their financial and managerial resources, current business portfolio and value chain position, most

companies are going to have to make very difficult strategic choices. Depending on the available resources, companies must decide whether to emphasize for instance R & D or investments in emerging markets.

Table 19: Summary of different strategic responses to adapt to industry transformation

Strategic responses	Challenges	Opportunities
Cost efficiency	Necessary but not enough Focus only on costs Motivation of personnel Reduced R & D and marketing expenditure Time consuming May require also investments Management time	Improves cost competitiveness Supply / demand balance
Value creation	Stuck-in-the-middle position Powerful suppliers and customers Changing the position is both time consuming and challenging - ie "where to go?"	Big opportunity for capturing larger share of total value New products and services
Consolidation	Inconclusive evidence of impact on improved pricing Feasibility questionable due to financing and regulators	Better investment discipline Cost synergies Bargaining power
R & D	Long time for commercialization Need to ensure competitiveness of existing products Tradition of incremental vs radical innovation	Some promising ideas Forest cluster cooperation
Emerging markets	Threat of overcapacity and imports to home regions Requires a lot of capital Country risks M & A and investment risks Intellectual property risks Knowledge transfer	Significant growth opportunities Low cost fiber - where feasible

This research and especially the industry interviews and profitability analysis warrant also the following observations that are strategically relevant for the industry:

(1) The profitability comparisons between companies of different sizes do not support the historical axiom of the industry that size correlates with profitability. There are many smaller or medium-sized companies that have outperformed their far bigger competitors in terms of profitability. It seems, that after a certain critical mass, the law of diminishing returns starts to kick in, and additional size and economies of scale do not bring the corresponding benefits. The strategic imperative for Western companies is now improved profitability, rather than growth. The Asian and South American companies are continuing to grow, mostly through greenfield investments.

(2) R & D and new product development are vital for the long –term future of the industry. Especially the comment by one of the interviewees deserves particular attention: “Everybody is in the same boat: paper and board suppliers, printing and converting machinery suppliers and brand owners. Deeper cooperation is needed”. The current intense focus on cutting costs should be done with the long-term future of the industry in mind. The industry interviews indicated a very clear need for increased funding for R & D and new product development.

(3) The value chain analysis offers great promises for the industry. One can argue, that the current dismal 5 % share of total value generation simply means , that the industry has become commoditized and is increasingly irrelevant to the consumer goods and publishing industries – only costs matter. This is not necessarily the case – this seems similar to seeing a glass half-empty rather than half-full.

Companies should carefully consider their position in the value chain, the competences that they have and the feasibility of capturing even a slightly bigger slice of the total value offering through improving product quality, service and marketing. Companies need to make a choice: retain the current position in the value chain and defend it through cost competitiveness, strive for added –value or withdraw from the current position.

(4) Companies that have the necessary financial resources should reconsider their strategies for expansion in the emerging markets. The current growth strategy of most companies is based on a very cautious approach of joint venturing to build greenfield capacity, which ultimately adds to the industry’s most serious problem- demand and supply imbalance. M & A – which also includes risks just as greenfield investments – should be considered as the primary form of expansion if companies want to expand more rapidly into these markets.

The current 10-20 % of turnover generated by operations in the emerging markets is insufficient to have a significant impact on company structures and profitability.

(5) Successful turnaround management is becoming a critical success factor for the industry in defending the competitiveness of the operations in the home regions. The success rate indicated by the cases studied in this research is not encouraging: only 5 out of 12 cases studied were successful. Other research shows, that most of the big programs throughout different industries – whether they concern IT investments, M & A or cost reductions – fail to meet their original objectives.

Companies should evaluate their own experiences of this, their managerial capabilities and ensuring that they take a robust, realistic and holistically managed approach to turnaround management. Asset management was cited as the most important future competence in the industry interviews. The above applies not only to the clear crisis units, but also to other - currently still reasonably profitable - business units.

(6) None of the analyzed competitive measures – improved cost efficiency, changing value chain position, increased consolidation, enhanced R & D and growth in emerging markets – is enough on its own to significantly improve profitability. All of these are time-consuming and there is no evidence to support the view that for instance consolidation on its own would eventually return the industry to healthy profitability. Many of the smaller companies do not have the financial resources to expand in the emerging markets and their strategy is focused on the home region – however, even they must actively follow the developments in emerging markets and maintain competitiveness against possibly increasing future imports. Companies must consider all of these and focus their financial and managerial resources accordingly.

However, despite the considerable challenges discussed above, it must also be noted that globally the demand for pulp and paper continues to grow and it will most likely remain a major industry also in North America and Europe. The fact, that a number of companies have financially performed reasonably well even in the very challenging business environment of the last few years, indicates that the industry can transform itself and eventually return to healthy profitability. Much depends on the strategic choices industry leaders must make.

Perhaps it is appropriate to cite one of the interviewees of the industry interviews: “Strategic thinking should now be the number one priority for industry leaders!”.

12 LIMITATIONS OF THE STUDY AND SUGGESTIONS FOR FURTHER RESEARCH

In this concluding chapter the limitations and reliability of the study as well as suggestions for further research are analyzed.

12.1. Scope and methodology related issues

There are a number of important limitations to the study, that need to be considered when assessing the results and conclusions.

The most important limitation is the scope of the study. The study covers a wide range of strategically important issues, and an in-depth analysis of each of these was beyond the scope. Therefore, the researcher has focused on the most essential elements of each issue – for instance, regarding consolidation, only its impact on pricing and profitability as well as the feasibility of further consolidation was analyzed. Other aspects of consolidation were not studied.

On the other hand, there are other important issues such as environment and energy that effect the future of the industry. These were decided to be beyond the scope, which is already very wide. However, the researcher believes that the most important issues such as cost efficiency, R & D and emerging markets have been covered.

Another important consideration is the extent to which the study is truly global – as it has been intended to be. Despite the fact, that industry interviews took place also in South Africa, India, China and North America, half of the interviewees were European. This is mitigated to an extent by the fact, that the European companies in question also had sizable presence on other continents as well, and the issues and questions covered were global in nature. However, the perspective of this research is a European one.

The in-depth interviews regarding industry challenges and future were carried out during 2007 and 2008. It can be argued, that the industry situation and beliefs of the industry leaders have changed during the elapsed two years and the results are no longer valid. However, most of the issued covered fundamental and macro-level issues such as overcapacity, globalization, industry consolidation and role of R & D – two years is a very short time to have a significant impact on these issues. Furthermore, pulp and paper is generally considered to be a conservative industry with a long planning horizon and long-standing basic beliefs. While some of the prioritizations may have changed since 2007-2008, this should not have any significant impact on the results and the conclusions. The financial results of the industry since 2008 have also not changed significantly.

The above applies also to the quantitative analysis and especially the financial performance of the industry, which covered the years from 2003 to 2008 or six consecutive years. Unfortunately the financial results are still valid for 2009 – no major improvement has taken place for most of the biggest companies and the financial results during 2009 were unsatisfactory. Therefore, the conclusions from the financial performance and cost structures remain valid also today.

A significant limitation of the value chain analysis was the fact, that only two printers were part of the EBIT calculations. However, as discussed earlier, most printers are private companies and they do not disclose their financial figures. This has to be borne in mind when interpreting the results.

A part of the study consisted of turnaround management, and these cases were analyzed only in Europe. This part of the research cannot therefore be considered truly global – while the literature suggests that the results are consistent with how turnaround management issues are handled in North America, there are important cultural differences and legal considerations with how these could be managed for instance in China or India. The conclusions regarding turnaround management can therefore be considered valid only for Europe.

It can be argued, that only 36 in-depth interviews is not a sufficiently representative sample to cover all the issues that were asked. However, the sample does include some of the biggest pulp and paper companies, their suppliers and customers. Previous studies outlined in chapter 2 using the interview methodology had similar sample sizes and statistical results. The statistical analysis of the results – with a standard deviation of 0.97 on average on a range of responses between 1-5 – can be considered typical for this type of a study. However, it is clear that a bigger sample would certainly have improved the validity and generalization aspects of the results.

Finally, there are issues related to methodology that need to be considered. The industry interviews followed a standard procedure of formulating the questionnaire, testing it with one interviewee, making the necessary adjustments and thereafter conducting the interviews.

However, only half of the interviews were carried out face-to-face – the others were carried out by phone or via mail. It is possible, that in some of the interviews that were carried out via mail, the respondents understood some of the questions differently from those that were carried out face-to-face.

In analyzing the results, any inconsistencies due to this were removed from the conclusions – the researcher discovered four responses to individual questions that could not be taken into account and were excluded from the results. The interview results were further validated in the presentation and discussion of the results with the

senior management of several both participating and non-participating companies, and no serious issues were taken up regarding the reliability of the results.

A more difficult methodology – related problem is related to the interviews regarding turnaround management. Although in most of the cases more than one person was interviewed and wherever possible documentation such as the key financial figures of the case were reviewed, the cases took place between 1997 and 2006. In some cases several years had elapsed between the actual event and the interview.

Also, there are the problems of bias, confidentiality and the sensitive nature of the issues. These issues were attempted to be mitigated by interviewing more than one person and carefully considering above aspects. But the results need to be interpreted bearing in mind the above aspects.

12.2. Suggestions for further research

This research attempts to add to the existing body of knowledge regarding a wide range of issues facing the pulp and paper industry. Due to problems of scope, some of these have not been treated with the depth and extent that the researcher had hoped for. A number of very interesting topics for further research are listed in the following:

(1) Industry consolidation: the conclusion of this research was that so far there is no evidence of increased consolidation either on a global level or within specific grades and regions having a direct impact on profitability. Consolidation theoretically results in many benefits – such as better capacity management, investment discipline and above all, improved pricing. In many paper grades there already exists a high degree of consolidation, yet the results are not reflected on the profit and loss statements of the industry. Further research on this is needed.

(2) The potential for capturing a bigger share of the total value offering should be studied further. It should not be impossible to increase the share of paper and board from the current 5 % to 6 % of the total value creation – achieving this would mean a substantial increase in industry profitability. The risk is, that the industry is currently focusing just on costs, rather than the added-value aspects of improved profitability. The issues to be studied further would have to include what is needed in terms of improved quality, marketing and service to justify the extra costs for the big publishers and brand-owners.

(3) The need for pulp and paper and especially the publishing and printing industry to defend their joint business against substitution from electronic media would warrant further study. One of the aspects should be, what are the obstacles for improved cooperation and what forms of cooperation could be most fruitful.

(4) Research into the business and societal problems created by developing plantation wood fields and building new pulp mills based on these would require further study. Competition for land use between pulp producers and agriculture is likely to eventually place a constraint for the growth of plantation pulp production. Companies must take sustainability and reputation issues very seriously nowadays, and the limitations for further expansion of eucalyptus and acacia based pulp production would be an important topic for further research.

(5) Climate change and the European policies with regard to taxation and requirements on renewable energy are a major issue facing the industry. This is likely to shape the industry future very significantly. As this issue was defined as out of scope for this study, it would certainly be a very interesting topic for further research.

There can obviously be many other topics for further research as well – however, the above –mentioned would seem to be the most relevant and urgent from the viewpoint of this research. The researcher hopes, that also this research has brought up a number of important issues, food for constructive academic debate and ideas for further research on the pulp and paper industry.

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Stora Enso

SCA

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Metsäliitto

M-real

Smurfit-Stone

Abitibi-Bowater

Georgia-Pacific (2003 – 2005)

MeadWestvaco

Norske Skog

Sappi
Holmen
Myllykoski
Mayr-Melnhof
Portucel-Soporcel
Nippon Paper
Oji Paper
Amcor
Södra Skogsägarna
Aracruz
Votorantim
Boise Cascade
Andritz
Kvaerner
Metso
Voith
Kemira
Imerys
Akzo-Nobel
Dow
Ciba
Hercules
Aller
Axel Springer
Gruner - Jahr
News Corporation
The New York Times Company
SocPress
Tribune Company
Pearson
Reed-Elsevier
EMAP
Sanoma-WSOY
Hachette
RR Donnelley
Quebecor World
PaperLinX
Antalis
Danone
British-American Tobacco
Procter & Gamble
Unilever
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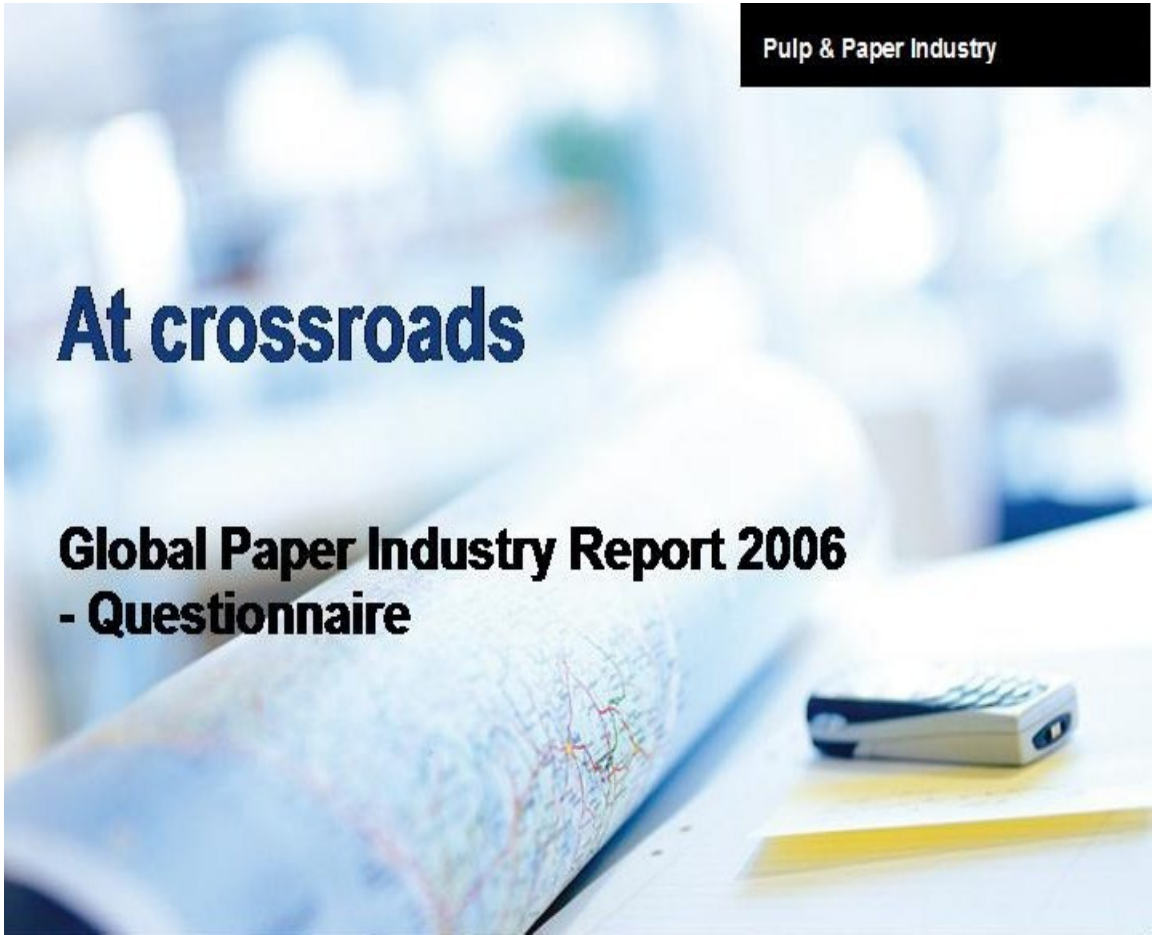
I

APPENDIX 1: INTERVIEW QUESTIONNAIRE FOR INDUSTRY FUTURE

Pulp & Paper Industry

At crossroads

Global Paper Industry Report 2006 - Questionnaire



Global trends

- Which of the following trends you see shaping the industry over the next 5 years:
 - 1 Consolidation of paper producers continues
 - 2 Consolidation of customers continues
 - 3 Real-term prices continue to fall
 - 4 Electronic media increasingly displaces printed media
 - 5 Production capacity in North America and Western Europe falls significantly and is increasingly displaced by capacity in emerging markets
 - 6 High energy costs continue to persist
 - 7 Use of wood for bioenergy

**Please rank the above
(5= very significant, 1 no impact)**

Comments: _____

Global trends

- How would you estimate the new pulp & paper production capacity growth over the next 5 years in the below regions?

- 1 China
- 2 India
- 3 Russia
- 4 Eastern Europe
- 5 North America
- 6 Western Europe
- 7 Latin America
- 8 South Africa
- 9 Rest of the world

5= Strong growth, 1 =No growth

Comments: _____

Global trends

- Which of the following environmental issues you consider are most relevant to the industry?

- 1 Kyoto and carbon trading
- 2 Illegal logging
- 3 Increased recycling
- 4 Transportation
- 5 Forest certification
- 6 Biodiversity conservation

5= High relevance, 1 = No relevance

Comments: _____

Industry challenges

- Which of the following issues you consider are the most important issues facing the industry today?

- 1 Demand / supply imbalance
- 2 Insufficient consolidation
- 3 Cost reductions
- 4 Improved product focus
- 5 Improved customer focus
- 6 Developing higher added-value products and services
- 7 Currency fluctuations
- 8 Funding for R & D
- 9 Electronic media
- 10 Rise of the emerging market capacity
- 11 Wood and fibre availability
- 12 Poor image of the industry
- 13 Lack of attractiveness to the capital markets
- 14 Availability of skilled personnel

5 = Very important, 1= Not important

Comments: _____

Industry challenges

- Which of the following risks you consider the most important for the industry:

- 1 Foreign Exchange
- 2 Country and political risks
- 3 Investment and project risks
- 4 Fraud
- 5 Technology and knowhow security

5= Very significant, 1= No risk

Comments: _____

Industry future

- Currently the 10 biggest producers have a global market share of ca 25 %. At what level do you anticipate this to be in 5 years:

1 Current level
2 30 %
3 40 %
4 50 %
5 Other
- What do you consider the most important drivers for increased consolidation

1 Cost reductions from economies of scale
2 Customer consolidation
3 Supplier consolidation
4 Geographic diversification
5 Product diversification
6 Product focus and market share
7 Reduced risks
- Please indicate each of these on a scale from 1=No importance and 5 = Very important

Comments: _____

Industry future

- Currently the industry is spending on average 0,7 % of turnover on R & D. Additionally, the machinery and chemicals suppliers spend ca 2,5 %. What level of future R & D spending do you think would be most appropriate for the industry?

1 < 0,7 % of turnover
2 0,7 % of turnover
3 0,7 %- 1,0 % of turnover
4 1,0 - 1,5 % of turnover
5 1,5 - 2,5 % of turnover
6 > 2,5 % of turnover

Comment: _____

Industry future

- Which specific competences and capabilities do you think the industry needs to improve further in order to succeed in the future:

- 1 Asset management
- 2 New product development
- 3 New service solutions
- 4 eCommerce solutions
- 5 Enterprise Resource Planning systems
- 6 Risk and project management
- 7 Understanding of emerging market cultures
- 8 M & A capabilities
- 9 Better demand planning and forecasting
- 10 Outsourcing agreements

5= Very high importance 1= No importance

Comments: _____

Industry future

- Do you have any specific comments or messages you think should be given more attention by the pulp & paper industry?

- If so, please let us know if you wish to remain anonymous or if you wish to be directly quoted?

II

APPENDIX 2: STATISTICAL ANALYSIS OF THE INTERVIEW RESULTS

APPENDIX 2: STANDARD DEVIATIONS OF THE INTERVIEW RESULTS

QUESTION	COMPANY															
	A	B	C	D	E	F	G	H	I	G	H	I	J	K	L	M
CONSOLIDATION	3	3	5	5	4	4	2	2	5	2	3	5	5	5	4	4
CONS. CUSTOMERS	3	2	3	3	3	3	1	3	4	1	1	4	4	4	4	2
REAL-TERM PRICES	3	5	5	1	5	3	2	3	4	4	1	4	3	4	4	4
ELECTRONIC MEDIA	3	3	3	2	3	3	4	3	5	2	1	3	4	3	5	2
PROD. CAPACITY IN THE WEST	4	4	3	5	4	4	4	3	3	4	3	3	2	2	5	4
HIGH ENERGY COSTS	5	5	2	2	4	4	3	4	5	3	3	5	3	3	4	3
BIOENERGY	2	2	2	5	3	4	4	4	2	2	2	2	3	2	4	3
CHINA	5	5	5	4	5	4	4	5	5	4	4	5	5	5	5	4
INDIA	4	4	5	5	3	4	5	3	4	3	4	3	3	5	4	5
RUSSIA	3	3	3	5	3	4	5	2	4	3	3	4	2	4	3	4
EASTERN EUROPE	3	4	3	4	3	4	4	3	4	3	2	2	3	2	4	4
NORTH AMERICA	1	1	2	1	2	1	1	1	1	1	1	1	1	1	1	3
WESTERN EUROPE	1	1	2	2	1	2	2	2	1	1	1	1	1	1	1	2
LATIN AMERICA	3	2	3	2	4	4	3	5	3	3	3	5	3	4	4	4
SOUTHERN AFRICA	2	2	3	2	3	3	3	2	3	1	2	1	2	3	3	1
REST OF THE WORLD	2		2		3	2	2	3	3	1	2		1	5	3	1
KYOTO	5	5	3	4	5	5	4	5	5	4	5	5	4	4	4	3
ILLEGAL LOGGING	5	3	4	2	3	4	2	3	2	2	2	2	3	3	3	4
RECYCLING	3	2	3	4	4	4	3	3	5	4	3	2	1	3	4	3
TRANSPORTATION	4	2	3	5	4	4	2	3	3	4	4	5	4	3	4	5
FOREST CERTIFICATION	4	3	4	2	3	4	3	4	3	3	3	2	3	2	3	4
BIODIVERSITY	4	3	2	2	2	4	3	4	3	3	3	2	2	5	3	4
DEMAND AND SUPPLY IMBALANCE	5	5	5	5	5	5	4	5	5	4	3	5	5	4	4	4
CONSOLIDATION	4	4	2	4	3	3	2	3	5	2	4	5	2	3	4	3
IMPORTANCE OF COST REDUCTIONS	4	2	5	5	4	4	5	3	5	4	4	5	2	3	4	4
PRODUCT FOCUS	3	4	1	2	3	3	3	2	4	2	3	2	2	3	4	4
IMPROVED CUSTO FOCUS	3	5	5	5	3	3	4	5	3	2	3	5	3	3	4	5
ADDED-VALUE PRODUCTS	3	4	3	3	3	2	2	3	2	2	4	2	1	2	3	5
CURRENCY FLUCTUATIONS	2	2	1	2	2	4	2	3	2	2	2	2	2	2	3	4
R & D	3	5	5	3	1	1	2	3	3	4	3	2	1	2	2	5
ELECTRONIC MEDIA	3	4	4	4	2	4	5	5	4	3	2	3	4	4	5	2
EMERGING MARKETS	5	5	3	4	5	5	4	5	4	4	3	5	3	2	5	5
WOOD AVAILABILITY	4	4	2	5	4	3	2	3	2	4	4	5	4	2	3	5
POOR IMAGE	4	2	4	5	4	3	2	4	1	3	3	1	1	3	3	3
LACT OF CAPIITAL ATTRACTIVENESS	4	4	4	1	4	3	4	4	1	4	5	1	1	3	2	4
SKILLED PERSONNEL	4	3	2	3	1	2	3	3	2	3	2	1	1		2	3
FOREIGN EXCHANGE RISKS	3	1	2	2	2	4	3	4	3	2	2	2	4		3	4
COUNTRY RISKS	3	5	4	3	3	3	4	4	4	2	2	4	4		4	3
INVESTMENT RISKS	4	4	3	2	3	5	3	3	4	4	4	5	2		3	3
FRAUD	4	4	2	2	2	2	2	2	1	2	1	2	2		3	2
TECHNOLOGY SECURITY	3	4	2	1	2	2	1	3	3	2	2	2	2		2	4
COST REDC. ECONOMIES SCALE	2	2	5	5	5	5	5	2	5	4	2	5	2	5	4	5
CUSTOMER CONSOLIDATION	2	3	3	3	3	3	2	3	3	2	2	3	2	4	4	3
SUPPLIER CONSOLIDATION	3	2	2	3	3	2	1	2	2	1	2	3	2	2	2	4
GEOGR.DIVERSIFICATION	3	5	2	5	4	4	4	5	2	5	3	1	4	2	3	5
PRODUCT DIVERSIFICATION	4	5	1	2	2	3	2	2	5	3	4	1	4	2	3	2
PRODCFOCUS AND MARKET SHARE	3	4	3	5	2	3	3	4	4	2	4	4	4	3	4	3
REDUCED RISKS	5	3	3	5	2	3	3	3	3	4	3	5	2	2	4	3
ASSET MANAGEMENT	4	5	3	5	5	5	4	5	4	4	2		5	5	5	4
NEW PRODUCT DEVELOPMENT	5	4	5	4	3	3	2	3	4	4	3		2	3	5	5
NEW SERVICE SOLUTIONS	3	4	5	2	3	3	4	5	3	3	3		5	4	4	5
E-COMMERCE	4	3	3	2	3	3	2	3	2	3	2		1	4	4	3
ERP SYSTEMS	4	3	2	3	2	4	3	3	3	2	2		2	3	4	3
RISK AND PROJECT MGMT	4	5	3	5	5	3	3	4	3	3	3		3	2	3	3
EMERGING MARKET CULTURES	4	5	2	5	4	5	3	4	4	3	3		2	4	4	5
M & A	5	3	3	4	4	4	2	4	4	5	3		1	3	5	4
DEMAND FORECASTING	4	4	4	5	5	4	3	3	5	4	3		4	3	3	4
OUTSOURCING	3	4	3	5	4	4	5	3	4	3	3		1	4	3	3

N	O	P	Q	R	S	T	U	V	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	SDEV	MEAN	95 % CONFIDENCE LIMIT
5	3	3	4	4	3	4	3	2	3	5	2	3	4	2	4	3	5	4	1,06	3,63	2,1
2	4	3	2	3	2	3	1	2	3	5	3	4	2	3	3	3	3	4	1,00	2,86	2,0
5	4	2	3	4	5	4	4	5	3	1	3	2	3	3	3	3	4	2	1,17	3,37	2,3
3	3	4	3	3	3	3	2	2	2	5	3	2	2	3	2	1	5	1	1,08	2,89	2,2
5	3	4	5	3	5	3	3	5	2	3	4	2	3	4	4	4	4	5	0,94	3,66	1,9
5	4	5	4	4	4	5	5	3	3	3	4	3	5	4	3	2	3	3	0,96	3,71	1,9
3	2	3	3	3	2	2	3	4	2		4	1	5	1	2	4	2	3	1,04	2,79	2,1
5	3	5	5	5	3	5	5	5	5	5	5	5	5	5	4	5	5	3	0,65	4,63	1,3
5	4	4	3	2	3	3	5	3	3	5	3	2	2	3	5	4	3	4	0,96	3,71	1,9
5	2	3	2	2	2	5	3	3	2	5	3	3	3	2	4	2	4	2	1,02	3,20	2,0
3	4	3	4	3	2	3	4	2	3	3	2	3	3	2	3	2	3	3	0,73	3,06	1,5
1	2	1	1	1	1	1	3	1	1	1	1	1	1	1	1	2	2	2	0,57	1,29	1,1
1	2	2	2	2	1	1	3	1	1	1	1	2	2	2	2	2	2	2	0,56	1,54	1,1
5	3	3	5	5	5	4	4	5	2	5	2	3	3	1	4	4	4	4	1,06	3,60	2,1
2		2	2	3	2	1	4	1	1	2	2	2	2	1	3	3	3	4	0,88	2,21	1,8
3		3		2	2	3	3	2	2	2	2	2	3	2	2	3	3	3	0,81	2,40	1,6
2	3	2	3	4	5	3	4	4	3	5	4	4	4	5	5	3	4	5	0,91	4,58	1,8
2	3	4	3	4	2	4	3	4	2	3	4	2	3	1	4	5	3	2	0,97	3,00	1,9
5	3	3	4	3	5	5	3	2	4	5	3	5	5	4	4	3	5	5	1,06	3,63	2,1
2	5	5	2	4	4	3	3	3	4	5	2	3	4	5	3	4	5	5	1,02	3,71	2,0
5	3	4	2	3	2	5	4	2	4	5	2	4	5	5	4	2	5	3	1,03	3,40	2,1
3	3	4	4	3	3	2	4	2	3	5	2	2	4	4	3	3	4	3	0,88	3,14	1,8
5	4	5	4	4	4	5	2	5	5	5	5	5	4	4	2	3	5	3	0,87	4,34	1,7
4	4	3	4	3	4	5	3	5	2	5	3	4	4	2	2	2	3	3	1,00	3,37	2,0
4	3	4	3	4	2	3	3	3	3	5	4	4	5	5	4	4	5	5	0,93	3,89	1,9
3	4	2	2	3	3	2	3	3	2	5	2	4	3	2	3	4	3	3	0,87	2,89	1,7
5	4	3	2	3	5	5	4	3	2	5	4	4	5	3	3	5	3	4	1,02	3,80	2,0
3	3	5	3	3	4	5	4	2	3	4	4	4	4	2	4	4	3	4	0,99	3,20	2,0
3	2	4	2	2	1	4	3	3	3	3	2	2	2	4	3	3	4	4	0,88	2,63	1,8
4	3	3	4	3	2	1	4	2	2	5	2	2	4	3	4	3	3	3	1,17	2,91	2,3
5	4	4	3	3	3	4	3	3	4	5	3	2	2	4	2	3	4	3	0,95	3,49	1,9
1	4	5	5	5	5	4	4	4	5	5	4	2	4	5	4	3	5	4	1,03	4,14	2,1
4	4	3	5	4	1	3	4	5	4	5	3	4	4	3	5	5	4	4	1,05	3,71	2,1
5	3	2	4	3	5	3	5	2	2	5	3	2	4	2	3	4	3	4	1,17	3,00	2,3
2	3	2	4	3	4	5	3	4	4	4	2	2	5	2	4	3	3	5	1,21	3,30	2,4
3	2	1	4	3	5	2	3	3	2	4	3	3	3	1	2	4	3	5	1,07	2,68	2,1
4	3	4	3	2	2	4	4	3	3	5	3	3	3	5	3	2	5	3	1,00	3,09	2,0
5	2	2	4	4	3	3	4	4	2	1	3	3	2	3	4	3	4	4	0,94	3,29	1,9
3	2	3	2	4	5	5	3	3	4	2	3	5	5	2	4	4	3	3	0,99	3,44	2,0
2	2	1	3	2	1	2	3	2	3	4	2	1	1	2	2	1	3	1	0,87	2,09	1,7
5	2	2	3	3	4	2	3	2	2	2	1	2	2	2	3	2	2	5	0,99	2,47	2,0
2	2	4	4	4	5	3	5	3	3	3	2	5	5	3	4	5	5	5	1,24	4,00	2,5
5	3	4	3	3	3	2	4	3	2	5	4	5	3	3	3	4	3	3	0,85	3,14	1,7
3	2	2	3	2	2	5	3	5	2	5	1	3	2	4	3	2	4	4	1,08	2,66	2,2
3		3	4	3	4	5	4	3	3	5	3	2	3	4	3	3	5	3	1,08	3,53	2,2
4		2	3	2	2	2	4	1	2	5	3	2	3	2	2	3	4	4	1,15	2,79	2,3
4	4	4	5	4	4	5	4	4	2	5	2	3	4	3	3	4	3	4	0,85	3,60	1,7
5	3	3	2	3	2	3	4	3	1	5	3	4	3	4	3	2	3	3	1,01	3,27	2,0
3	4	3	5	5	5	5	3	5	3	5	4	4	5	5	4	4	5	4	0,84	4,29	1,7
4	3	4	3	5	4	5	5	3	2	3	2	5	4	3	3	3	4	4	0,98	3,65	2,0
4	4	3	4	3	4	5	5	4	2	5	4	5	4	5	3	3	3	4	0,90	3,82	1,8
4	3	3	2	3	2	3	4	3	1	5	3	4	3	4	3	3	3	3	0,87	2,97	1,7
4	4	3	3	3	2	3	3	2	5	2	3	2	3	2	3	4	5	4	0,91	3,12	1,8
4	4	5	4	3	5	5	4	4	3	5	2	3	3	4	4	5	3	4	0,91	3,71	1,8
4	4	5	5	3	4	2	4	5	4	5	2	2	4	4	2	5	4	5	1,06	3,82	2,1
2	4	4	4	3	3	2	3	3	3		2	2	4	4	4	4	3	0,97	3,39	1,9	
5	1	5	4	3	5	3	4	3	2	5	4	4	3	3	4	5	3	5	0,98	3,79	2,0
3	3	5	5	4	4	3	3	3	2	4	4	4	4	4	2	4		4	0,90	3,55	1,8
																			0,96	3,29	1,93

**APPENDIX 3: INTERVIEW QUESTIONNAIRE FOR TURNAROUND
MANAGEMENT**

- 1 Introduction
 - Review of interview objectives
 - Confidentiality issues
 - Reporting
- 2 Background of the company/business unit in question
 - Products
 - Volume
 - Machinery
 - History
- 3 Background (briefly) of the interviewee
 - Current employer and position
 - Previous employers and positions
- 4 Describe briefly the turnaround program in question?
- 5 What position did you have in the mill in question?
- 6 When was the turnaround program initiated?
- 7 Describe the roles of corporate management, division management and mill management in initiating the program?
- 8 Describe the roles of corporate management and division management during the program ?
- 9 What were the main reasons for starting up the turnaround program?
- 10 What were the key figures – sales, EBITDA, volume and number of employees – at the beginning of the turnaround program ?
- 11 Did you or any other party – for instance corporate management – have a clear business strategy or action plan for implementing the turnaround program ?
- 12 Briefly describe the contents of the business strategy or action plan?
- 13 What were the reactions from the employees and local union when they were informed of the turnaround program?
- 14 How were communication and labour union relations managed during the turnaround program?

15 Describe briefly the relative importance (not important, important, critical) of each of the following during the turnaround program:

- 15 a): Cost reductions
- 15 b): Financial and other reporting
- 15 c): Sales and customer relations
- 15 d): Supply chain management and logistics
- 15 e): IT systems
- 15 f): Human resource management
- 15 g): Communication
- 15 h): New product development
- 15 i): Investments
- 15 j): Outsourcing

16 What was the duration of the turnaround program?

17 Describe how successful – failure, on-going, complete success - was the turnaround program?

18 What were the key figures – sales, EBITDA, volume, number of personnel - of the mill at the end of the turnaround program?

19 What are in your opinion the critical success factors in implementing turnaround programs in the paper industry?

20 Are there any other key persons that were involved in the turnaround program that we could interview?

21 Do you have any additional comments or quotations that would be relevant ?

22 Thank you very much for your time !

IV

APPENDIX 4: FINANCIAL RESULTS OF FOREST CLUSTER COMPANIES 2003 - 2008

Company (M USD)

CHEMICALS	2003	2004	2005	2006	2007	2008	Q1 2009	Q2 2009
Kemira Oyj								
Turnover	3514	3450	2353	3322	4137	3942,3	847,1	905,9
EBIT	188	264	195	266	211	103	39,1	71,5
EBIT%	5,4	7,7	8,3	8,0	5,1	2,6	4,6	7,9
Dow								
Turnover	32632	40161	46307	49124	53513	57514	9041	11322
EBIT	2487	4457	6963	4972	4683	579	24	-435
EBIT%	7,6	11,1	15,0	10,1	8,8	1,0	0,3	-3,8
Imerys								
Turnover	3447	3910	3592	4330	5008	4800,3	966,3	945,9
EBIT	469	575	512	604	704	561,4	61,8	91,3
EBIT%	13,6	14,7	14,3	13,9	14,1	11,7	6,4	9,7
Ciba								
Turnover	5398	6204	5628	5206	5803	5547		
EBIT	422	504	-94	379	491	-400		
EBIT%	7,8	8,1	-1,7	7,3	8,5	-7,2		
AkzoNobel								
Turnover	16332	17480	15336	18092	15040	21453	4554	5105
EBIT	1235	2080	1753	1925	1348	1971	198	515
EBIT%	7,6	11,9	11,4	10,6	9,0	9,2	4,3	10,1
Hercules								
Turnover	1846	1997	2069	2035	2136			
EBIT	255	229	142	249	220			
EBIT%	13,8	11,5	6,9	12,2	10,3			
Average EBIT%	9,3	10,8	9,0	10,4	9,3	2,9	2,6	4,0

PAPER AND BOARD**International Paper**

	2003	2004	2005	2006	2007	2008	Q1 2009	Q2 2009
Turnover	22183	23359	24097	21995	21890	24 829	5668	5802
EBIT	285	724	586	3188	1654	1393	779	788
EBIT%	1,3	3,1	2,4	14,5	7,6	5,6	13,7	13,6

Weyerhaeuser

Turnover	18458	18458	18845	18671	16308		1275	1391
EBIT	18458	18458	1786	1814	406	-2531	-330	-62
EBIT%			9,5	9,7	2,5	#JAKO/O!	-25,9	-4,5

Stora Enso

Turnover	15373	16884	15736	19260	19687	15 349	2965	3040,6
EBIT	595	962	-111	823	362	-1011	-1,3	-291,4
EBIT%	3,9	5,7	-0,7	4,3	1,8	-6,6	0,0	-9,6

SCA

Turnover	11832	13440	12267	14450	16511	14 141	3627	3574
EBIT	1076	1146	245	973	1582	1095	273	303
EBIT%	9,1	8,5	2,0	6,7	9,6	7,7	7,5	8,5

UPM Kymmene

Turnover	12361	13376	11028	13199	14773	13 167	2584	2562
EBIT	437	854	328	706	711	33	-132	11 ?
EBIT%	3,5	6,4	3,0	5,3	4,8	0,3	-5,1	0,4

Kimberly-Clark

Turnover	14026	15083	15903	16747	18266	19 415	4493	4727
EBIT	2332	2506	2311	2102	2616	2547	628	609
EBIT%						13,1	14	12,9

Metsäliitto

Turnover	10658	11898	10369	12210	11290	8954	1779	1688
EBIT	191	196	59	108	-40	3	-191	-78
EBIT%	1,8	1,6	0,6	0,9	-0,4	0,0	-10,7	-4,6

MeadWestvaco

Turnover	5566	6060	6170	6530	6906	6640	1354	1432
EBIT	18	224	135	98	400	79	-79	125
EBIT%	0,3	3,7	2,2	1,5	5,8	1,2	-5,8	8,7

Oji Paper

Turnover	10734	11558	10311	11839	14026	3095	Q1	3095
EBIT	434	696	337	378	363	142	Q4	142
EBIT%	4,0	6,0	3,3	3,2	2,6	#JAKO/0!		4,6

Nippon Paper

Turnover	11147	11505	9786	9950	11416	13151	Q1	2808
EBIT	365	340	16	378	309	221		79
EBIT%	3,3	3,0	0,2	3,8	2,7	1,7		2,8

Sappi

Turnover	4299	4728	5018	4941	5304	5863	Q2	1316
EBIT	286	188	-137	125	383	314	Q3	-7
EBIT%						5,4		-0,5
								0,5

Norske Skog

Turnover	3613	4184	3801	4658	5018	3778	751	737
EBIT	114	171	93	-409	125	389	72	81
EBIT%	3,2	4,1	2,4	-8,8	2,5	10,3		11,0

Myllykoski Group

Turnover	1815	1977	1715	2019	2177	2047	452	426
EBIT	77	61	61	-25	-16	15	11	40
EBIT%	4,2	3,1	3,6	-1,2	-0,7	0,7		9,4

Holmen

Turnover	2200	2364	2050	2709	2987	2475	580	576
EBIT	325	295	247	335	443	135	53	48
EBIT%	14,8	12,5	12,0	12,4	14,8	5,5		8,3

PUBLISHERS	2003	2004	2005	2006	2007	2008	Q1 2009	Q2 2009
News Corporation								
Turnover	20802	23859	25327	28655	32996	32,996	7373	7670
EBIT	2931	3564	3868	4452	5381	5,381	755	268
EBIT%	14,1	14,9	15,3	15,5	16,3	16,3		3,5
New York Times Company								
Turnover	3227	3304	3373	3290	3195	2948	609	584,5
EBIT	540	510	481	-521	227	-41	61,6	23,3
EBIT%	16,7	15,4	14,3	-15,8	7,1	-1,4		4,0
Tribune Company								
Turnover	5595	5726	5596	5518	5063			
EBIT	1361	1218	1147	1085	634			
EBIT%	24,3	21,3	20,5	19,7	12,5			
Reed Elsevier								
Turnover	9019	9635	8897	10450	9202	9354		
EBIT	1210	1534	1445	1704	1783	1580		
EBIT%	13,4	15,9	16,2	16,3	19,4	16,9		
EMAP								
Turnover	1882	1484	1470	1675	1775	410		
EBIT	287	276	263	300	253	35		
EBIT%	15,2	18,6	17,9	17,9	14,3	8,5		
Axel Springer								
Turnover	2931	3272	2822	3129	3795	3798	862,9	883,5
EBIT	245	430	389	491	621	585	89,1	90,2
EBIT%	8,4	13,1	13,8	15,7	16,4	15,4		10,2
Gruner & Jahr								
Turnover	3132	3324	3091	3767	4166	3854		
EBIT	301	291	295	365	389	313		
EBIT%	9,6	8,8	9,5	9,7	9,3	8,1		
Pearson								
Turnover	7246	6357	7464	8109	8467	6966		
EBIT	734	559	1011	1058	1267	1103		
EBIT%	10,1	8,8	13,5	13,0	15,0	15,8		

Hachette Livre

Turnover	1211	1934	1939	2601	21301	1653	?
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EBIT	135	223	223	290	352	77	
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EBIT%	11,1	11,5	11,5	11,1	1,7	4,6	
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Socpresse

Turnover	1865	2055	1660	0			
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EBIT	13	36	27	-0,214			
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EBIT%	0,7	1,8	1,6				
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Aller

Turnover	550	559	614	699	774	248	
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EBIT	42	66	74	50	50	16	
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EBIT%	7,6	11,8	12,1	7,2	6,5	6,2	
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SanomaWSOY

Turnover	3026	3412	3093	3611	4308	4217	885,1
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EBIT	259	404	355	385	506	329	29,1
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EBIT%	8,6	11,8	11,5	10,7	11,7	7,8	970,3
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Average EBIT%

90,6

9,3

**APPENDIX 5: MAIN COST FACTORS IN SELECTED PRODUCTION
COUNTRIES IN 4TH QUARTER 2008**

APPENDIX 6: PPI TOP 100 LISTING 2007 - 2008

RESULTS FROM PULP, PAPER, CONVERTING & MERCHANTING OPERATIONS ONLY

Rank		2008 Sales (\$ million)		% change 2008/2007		Company (Headquarters)		Rank		2008 Sales (\$ million)		% change 2008/2007		2007 Earnings (\$ million)		Total assets (\$ million)		Market Paper & Board employees		Chief executive officer	
1	1	24,782.0	15.8	3	24,829.0	13.4	International Paper (Memphis, TN, US)	3	24,829.0	13.4	24,829.0	13.4	1,680.0	26,913.0	1,455	17,128	61,700	John Faraci			
2	3	13,899.0	9.2	1	85,503.0	11.8	Procter & Gamble (Cincinnati, OH, US)	1	85,503.0	11.8	12,075.0	11.8	10,340.0	83,992.0	NA	NA	135,000	Alan G. Lafley			
3	2	13,450.2	5.7	6	16,137.9	-0.7	Stora Enso (Helsinki, Finland)	5	16,137.9	-0.7	-987.3	-0.7	-291.2	17,911.4	830	11,746	33,815	Jouko Karvinen			
4	4	13,427.0	2.5	5	16,751.2	6.9	Svenska Cellulosa (SCA) (Stockholm, Sweden)	6	16,751.2	6.9	849.0	6.9	1,059.9	24,109.8	NA	6,374	51,990	Jan Johanson			
5	5	13,043.4	4.2	7	13,843.8	0.6	UPM (Helsinki, Finland)	7	13,843.8	0.6	-263.4	0.6	111.1	20,165.1	NA	10,641	24,983	Jussi Pesonen			
6	7	11,084.1	10.1	10	12,246.8	9.4	Oji Paper (Tokyo, Japan)	10	12,246.8	9.4	-61.1	-61.1	99.9	16,502.9	30	7,381	20,415	Kazuyasu Shinoda			
7	6	10,333.5	-2.5	8	10,333.5	3.7	Smurfit-Kappa (Dublin, Ireland)	8	10,333.5	3.7	-46.8	-46.8	228.1	11,902.1	0	7,100	41,000	Gary W. McGinn			
8	8	9,992.0	7.3	6	19,415.0	6.3	Kimberly-Clark (Dallas, TX, US)	4	19,415.0	6.3	1,690.0	6.3	1,823.0	18,089.0	0	NA	53,000	Thomas J. Falk			
9	9	9,983.4	11.7	9	11,483.3	11.6	Nippon Paper (Tokyo, Japan)	9	11,483.3	11.6	-225.5	-225.5	48.1	14,420.4	106	7,105	13,088	Yoshio Haga (President)			
10	10	9,284.3	7.6	11	9,284.3	8.0	Mondi (Aldershot, UK; Johannesburg, South Africa)	11	9,284.3	8.0	295.6	295.6	394.8	9,161.4	467	5,775	33,400	David Hathorn			
11	11	7,244.6	2.4	15	7,244.6	2.4	Sequana Capital (Paris, France)	15	7,244.6	2.4	-626.3	-626.3	212.5	2,701.2	0	1,300e	15,300	Pascal Lebard			
12	11	7,042.0	-5.1	16	7,042.0	-5.1	Smurfit-Stone Container (Chicago, IL, US)	16	7,042.0	-5.1	-2,820.0	-2,820.0	-115.0	4,594.0	426	6,462	21,300	Patrick J. Moore			
13	14	6,542.6	7.3	2	36,799.3	9.5	Marubeni (Tokyo, Japan)	2	36,799.3	9.5	1,074.8	1,074.8	1,823.0	45,496.1	1,130	1,748	3,856	Teruo Akada (President)			
14	24	6,352.0	79.2	17	6,771.0	74.7	AbitibiBowater (Montreal, QC, Canada)	17	6,771.0	74.7	-2,234.0	-2,234.0	-490.0	8,071.0	1,018	7,589	15,900	Ray Paterson			
15	14	6,253.1	-4.7	20	6,253.1	-4.7	PaperInX (Mount Waverley, Victoria, Australia)	20	6,253.1	-4.7	60.4	60.4	67.0	3,657.5	NA	785	9,365	Thomas Park			
16	17	6,154.0	8.1	19	6,394.0	7.5	Domtar (Montreal, QC, Canada)	19	6,394.0	7.5	-573.0	-573.0	70.0	6,104.0	1,372	3,916	11,000	Raymond Royer			
17	13	5,857.0	2.6	18	6,697.0	3.6	MMW (Glen Allen, VA, US)	18	6,697.0	3.6	90.0	90.0	285.0	8,445.0	NA	2,814	22,000	John A. Luke, Jr			
18	20	5,787.0	10.5	21	5,863.0	10.5	Sappi (Johannesburg, South Africa)	21	5,863.0	10.5	102.0	102.0	202.0	6,109.0	1,100	4,100	15,160	Ralph Boettger			
19	19	5,273.2	-5.3	14	7,783.5	-14.5	Amcor (Abbotsford, Victoria, Australia)	14	7,783.5	-14.5	216.2	216.2	446.6	6,741.8	0	NA	21,030	Ken Mackenzie			
20	12	4,934.0	-33.9	13	8,018.0	-25.9	Weyerhaeuser (Federal Way, WA, US)	13	8,018.0	-25.9	77.3	77.3	50.9	16,735.0	1,760	3,618	19,843	Daniel S Fulton*			
21	16	4,735.1	-1.3	22	4,735.1	-1.3	M-real (Espoo, Finland)	22	4,735.1	-1.3	-743.3	-743.3	-267.3	6,591.9	1,115	3,106	6,546	Mikko Helander			
22	21	4,687.1	1.3	23	4,687.1	1.3	Norske Skogindustrier (Oslo, Norway)	23	4,687.1	1.3	-489.6	-489.6	40.2	6,864.0	0	5,377	6,430	Christian Rymning-Tommesen			
23	22	4,420.7	18.2	24	4,502.0	16.3	Daio Paper (Ethime, Japan)	24	4,502.0	16.3	1.1	1.1	40.2	6,864.0	0	2,900	8,037	Motokiwa Itawa			
24	37	4,356.0	100.9	25	4,356.0	100.9	NewPage (Dayton, OH, US)	25	4,356.0	100.9	-142.0	-142.0	-22.0	4,246.0	NA	3,233	7,800	Mark A. Suwyn			
25	25	4,107.6	17.7	26	4,320.3	16.9	Graphic Packaging (Osaka, Japan)	26	4,320.3	16.9	88.5	88.5	28.4	4,416.9	0	2,490	9,089	Kiyoshi Otsubo			
26	30	4,079.4	68.5	28	4,079.4	68.5	Rego Packaging (Marietta, GA, US)	28	4,079.4	68.5	-99.7	-99.7	-74.6	14,400	0	2,032	14,400	David W. Scheible			
27	23	3,765.9	2.9	23	3,765.9	2.9	Socodas (Kingsley Falls, QC, Canada)	23	3,765.9	2.9	2.8	2.8	20.5	3,779.0	0	3,032	12,529	Aleim Lemaire			
28	28	3,244.3	3.0	27	4,122.4	2.0	Sonoco Products (Hartsville, SC, US)	27	4,122.4	2.0	164.6	164.6	214.1	3,086.0	0	1,555	17,500	Harris E. DeLoach			
29	26	3,190.0	4.8	29	3,884.0	-1.1	Temple-Inland (Austin, TX, US)	29	3,884.0	-1.1	-8.0	-8.0	1,305.0	5,869.0	0	3,455	11,000	Doyre Simons			
30	27	3,172.3	5.6	36	3,547.1	8.6	Burgo (San Mauro Tomes, Italy)	36	3,547.1	8.6	-129.6	-129.6	18.2	3,618.5	201	2,698	5,201	Girolamo Marzini			
31	29	3,170.0	15.8	35	3,533.0	14.8	CMPC (Santiago, Chile)	35	3,533.0	14.8	244.0	244.0	478.0	7,928.0	1,750	1,000	12,567	Arturo Mackenna			
32	34	2,838.9	22.6	34	2,838.9	22.6	RockTenn (Norcross, GA, US)	34	2,838.9	22.6	81.8	81.8	81.7	3,013.1	95	1,660	10,700	James A. Rubright			
33	31	2,533.2	6.4	42	2,532.9	6.4	Mayr-Melnhof Karton (Vienna, Austria)	42	2,532.9	6.4	141.8	141.8	159.9	2,086.6	0	1,527	8,240	Wilhelm Hörmannseider			
34	33	2,360.0	1.9	45	2,360.0	1.9	Packaging Corporation of America (Lake Forest, IL, US)	45	2,360.0	1.9	193.7	193.7	170.1	1,937.7	0	2,089	8,100	Paul T. Stecko			
35	44	2,328.0	23.9	47	2,328.0	23.9	Metsä-Botnia (Espoo, Finland)	47	2,328.0	23.9	304.9	304.9	176.3	3,552.0	0	1,860	1,860	Ilka Hämmälä*			
36	35	2,320.9	1.5	38	2,932.3	3.4	Holmen (Stockholm, Sweden)	38	2,932.3	3.4	97.4	97.4	222.8	5,247.9	0	2,524	4,829	Magnus Hall			
37	38	2,208.2	26.1	51	2,208.2	26.1	Suzano (Sao Paulo, Brazil)	51	2,208.2	26.1	-245.2	-245.2	275.6	7,041.8	1,524	1,140	3,540	Antonio Maciel Neto			
38	38	2,203.7	9.1	46	2,342.5	12.4	Lectra (Luxembourg)	46	2,342.5	12.4	-114.6	-114.6	-40.4	2,462.7	0	1,646	4,461	Santiago Ramirez			
39	39	2,152.4	8.6	52	2,152.4	8.6	Myllykoski (Anjalankoski, Finland)	52	2,152.4	8.6	-24.9	-24.9	1.4	2,477.3	0	2,287	2,989	Sverre Norrgård			
40	41	2,144.7	11.2	44	2,446.2	11.4	Mitsubishi Paper (Tokyo, Japan)	44	2,446.2	11.4	11.6	11.6	31.4	2,844.4	NA	944	4,597	Takeshi Sato			
41	36	2,109.0	-4.1	40	3,866.0	-1.8	DS Smith (London, UK)	40	3,866.0	-1.8	-20.6	-20.6	156.4	2,845.8	0	1,000	11,500	Tony Thorne			
42	43	2,093.3	14.9	53	2,230.5	11.9	Shandong Chenming Paper (Shouguang, China)	53	2,230.5	11.9	122.7	122.7	115.5	3,777.4	0	3,170	17,163	Chen Hongxun (Chairman)			
43	32	2,071.0	NA	58	2,071.0	NA	Boise Inc (Boise, ID, US)	58	2,071.0	NA	-46.0	-46.0	NA	1,988.0	218	2,478	4,350	Alexander Toedt*			
44	54	2,027.2	56.7	56	2,027.2	56.7	Nine Dragons Paper (Hong Kong)	56	2,027.2	56.7	270.9	270.9	4,684.2	NA	4,300	10,840	Lim Ming Chung				
45	40	1,911.3	1.5	56	1,911.3	1.5	Aracruz Celulose (Sao Paulo, Brazil)	56	1,911.3	1.5	-1,238.7	-1,238.7	422.1	5,399.4	2,917	55	2,665	Carlos Augusto Lira Aguiar			
46	46	1,792.8	3.7	33	3,689.0	3.1	Arauco (Santiago, Chile)	33	3,689.0	3.1	479.0	479.0	696.0	8,853.0	2,777	0	NA	Matias Domeyko Casel			
47	47	1,766.8	8.5	58	1,766.8	8.5	Verso Paper (Memphis, TN, US)	58	1,766.8	8.5	-62.8	-62.8	-111.5	1,636.4	226	1,509	2,900	Michael A. Jackson			
48	48	1,734.0	8.6	59	1,734.0	8.6	Catalyst Paper (Richmond, BC, Canada)	59	1,734.0	8.6	-29.4	-29.4	2,271.5	5,037	503	1,557	2,700	Richard Garneau			
49	42	1,729.6	-5.6	50	2,227.5	-13.0	Tembec (Montreal, QC, Canada)	50	2,227.5	-13.0	-140.6	-140.6	45.0	1,520.6	1,720	715	6,727	James Lopez			
50	50	1,683.0	17.2	40	1,683.0	17.2	Klabin (Sao Paulo, Brazil)	40	1,683.0	17.2	-189.7	-189.7	310.0	4,478.8	0	1,579	10,500	Reinold Pöörnbacher			

General notes: The main difference to our ranking is that we have removed the separate business segment columns for "Pulp, Paper," "Converting," and "Merchandising." The reason behind this is because many companies do not break down these segments in their financial reports. The 2008 rankings are based on revised financial data received for this year's report, not on the rankings listed in last year's PPI. Unless noted below, the financial year reported is January 1, 2008 to December 31, 2008. Where possible, earnings are net earnings, and are calculated after tax and excluding extraordinary items. An "e" in PPI estimates indicates that the company defined to supply data. An "NA" means not available and indicated that the company did not supply data. The "PPI" column indicates that the person in this position, figures have been converted to US dollars. Figures have been rounded to the nearest decimal point.

Company notes: International Paper: PPI net sales are excluding Forest Products, Paper and Other, but including Distribution. Production figures are sales volume and include intersegment sales. The main difference to our ranking is that we have removed the separate business segment columns for "Pulp, Paper," "Converting," and "Merchandising." The reason behind this is because many companies do not break down these segments in their financial reports. The 2008 rankings are based on revised financial data received for this year's report, not on the rankings listed in last year's PPI. Unless noted below, the financial year reported is January 1, 2008 to December 31, 2008. Where possible, earnings are net earnings, and are calculated after tax and excluding extraordinary items. An "e" in PPI estimates indicates that the company defined to supply data. An "NA" means not available and indicated that the company did not supply data. The "PPI" column indicates that the person in this position, figures have been converted to US dollars. Figures have been rounded to the nearest decimal point.

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