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Strategic Implications of eCommerce for Papermakers

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Interim Report

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Strategic Implications of eCommerce for Papermakers

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Abstract

It is expected that the paper and office products supply chain will move online in the very near future. The hubris of new eBusiness models has ended in a fragmented picture of a multitude of personal views relating to future developments on the eEconomy, eIndustry and eEnterprise levels. This paper endeavors to compile the currently existing knowledge in this field and to identify the basic drivers and inhibitors of the new economy that are of relevance to the forest industry. On the eEconomy level, acceleration in macro-economic growth can be expected due to efficiency and productivity improvements that are triggered by the elimination of information barriers thereby creating more efficient markets. On the eIndustry level, globally operating and more adaptive industry networks will improve economic performance by reaping economies of scale. Less volatile markets will result from improved planning and coordination thereby eliminating redundant capacities. An overly horizontally concentrated market structure might bear the danger of locking the paper industry in an underdevelopment trap of innovation exhaustion and organizational inertia. Business entities on the eEnterprise level will have to adopt the principles of openness, connectivity and strategic integration to fully benefit from networking and integration effects along the entire value chain. However a number of issues, such as sharing critical data in a networked economy, will increase demands for newly adapted business culture and management models.

About the Authors

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Strategic Implications of eCommerce for Papermakers

Michael Obersteiner and Sten Nilsson

1. Background

An increasing number of people have witnessed the extraordinary impact of the information revolution on the operating processes of the organizations they work with and in their everyday lives. The trajectory of the information revolution is exponential in scale and scope. In this respect the evolution of biological life and of technology have both followed the same pattern: they take a long time to get going but advances build on one another and progress erupts in an increasingly furious pace according to the so-called “*Law of Accelerating Returns*”. New products create new demands, which in turn lead to new opportunities and creative destruction within and between industries. Changes are underway that alter the structure of entire industries and peoples’ life styles, forcing decision makers to rethink their strategic fundamentals — not just in high-tech and information industries but across the whole economy and society. By its nature, the Internet is a general-purpose technology and no company, individual or government is immune to these changes. Now, the information age is beginning to have a significant strategic impact on all levels of our global societies. For this particular study, the forest and allied industries, capital markets, governmental and non-governmental organizations are all stakeholders, who need to have a vital interest in the effects of the Information Technology (IT) revolution on their own operations and everyday lives.

According to Forrester Research (2000) the paper and office products supply chain will be available online by mid 2000 and will move, according to their theory, into a hyper-growth period by 2003. A number of very recent studies have also started to look into this issue on the surface and mostly encompass personal views on the short-term. In many cases, industry is far ahead of academia in the experimental use and general understanding of the Internet and the onset of eBusiness.¹ However, little time has been spent to systematically identify the principles of eBusiness, its implications on business, the industry and how it will be organized, the economy, the way people (e)live and (e)work, and the implications of how successful it will be in each of these areas. The eEconomy is moving at electronic speed leaving little time for reflection and orientation and simultaneously calls for nothing less than complete organizational metamorphosis. There is an acute shortage of long-term strategies on how to deal with the IT revolution within and outside the forest industry. This acute lack of solid research provided us, as a

¹ In Europe, the ‘e’ is increasingly changed to ‘M’. ‘M’ stands for “mobile” thus e-Business becomes M-business.

neutral outsider, with the idea of establishing a study to investigate the effects of the new IT revolution on the global forest sector.

Based on empirical studies in other sectors and theory building, this research will provide guidance to the sector in its transition to a fully e-based paper industry network. We will provide a step-wise approach beginning with the eEconomy, on to the eIndustry and ending with the eEnterprise. In this first-cut overview paper we will try to provide answers to a set of questions such as:

- What are the most important sources of change in the eEconomy?
- What are the strategies and necessary steps to facilitate the smooth transition of existing industrial and business configurations to the electronic market place?
- Do the new force factors (drivers) favor outsourcing and partnering?
- How will the extended enterprise concept improve supply chain efficiencies, and how will procurement practices and marketing be affected?

2. eEconomy

There are very few technologies that are capable of explaining up-swings in red wavelength business cycles. Historically, it was the new general-purpose technologies that brought about significant productivity improvements and altered the competitive landscape of and within industries. Such technologies provide the seeds of radical and inherently poor predictable change. It is becoming clear today that the Internet is such a technology and great changes can be expected. It should be recognized that nearly all companies will eventually become Internet companies; in a similar way that they are telephone companies today. The Internet will be so deeply embedded into the way they will be organized that people will no longer think or become oversensitive about it as they are nowadays.

While, the Internet's commercial epigons — the eTraders — may not yet be fully representative to explain a new up-swing in the red wave spectrum or a new commercial paradigm, electronic commerce (eCommerce) plays an increasing catalytic role within and between commercially active organizations. New digital market places in the Internet have emerged and enterprises are about to become extended enterprises, which are guided by the principles of openness, connectivity, and integration. By blurring the borders of the enterprises, new models for organizing production and transacting business are emerging, thereby forcing existing firms to re-examine their cost structure and competitive strategy. This way the capitalist machine gains new momentum and further increases productivity and eliminates inefficiencies. This new momentum is not only witnessed on the eCommerce level, but also on the eIndustry and eEconomy levels.

Figure 1 illustrates a very simplistic model that has been designed to capture the main drivers of the new economy phenomenon and provide a simple theory of their interaction. There is a self-reinforcing feedback loop between the main sectors of the economy — Producers — Mediation — Consumers. New information technology makes markets more efficient, trapping producers in a more competitive equilibrium. More efficient markets increase the consumers' (households) purchasing power

allowing them to afford new or higher quality products. All of these factors, combined with an increase of the tact speed of all the processes in the economy, lead to accelerated economic growth. Similar mechanisms are described in the academic literature of the ‘new growth theory’ (see, e.g., Jones, 1999). However, a thorough mathematical treatment of the issue would by far exceed the scope of this paper.

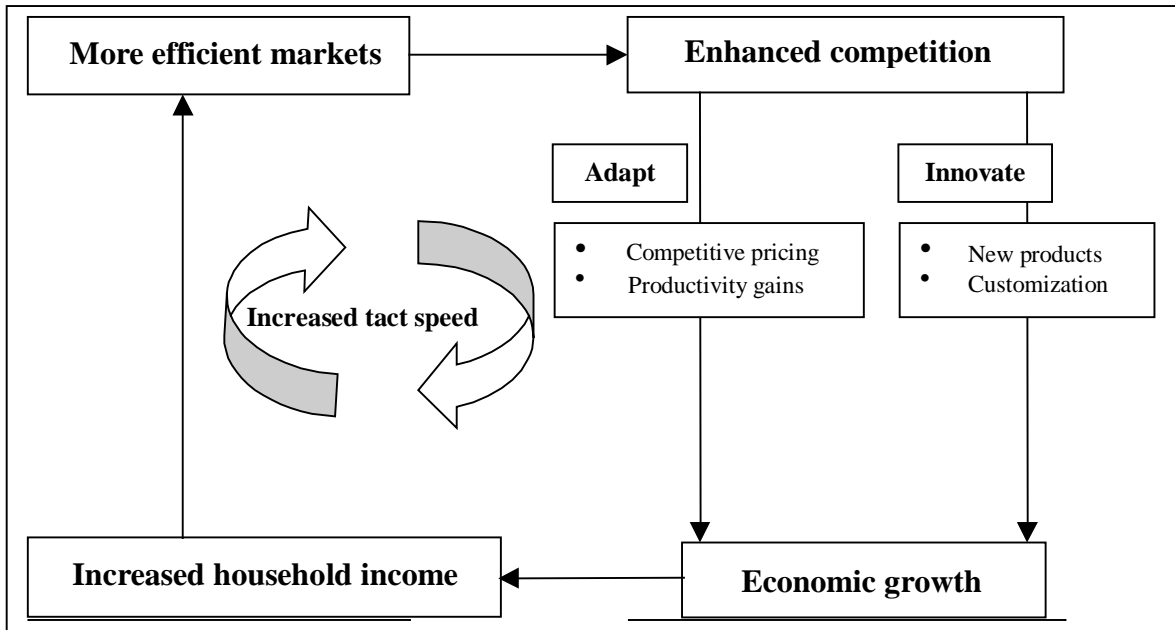


Figure 1: The world's simplest new economy model.

2.1 Efficient Markets

Transaction and information costs are drastically reduced due to IT revolutionizing business processes. The Internet allows buyers to search for products they would like to have at lower cost, in less time, with a larger geographical span and depth of content. eMarkets are more global by nature and transaction costs are much smaller than in traditional trade models. Buyers do not have to carry the costs associated with the brick and mortar storefront, travel costs are eliminated, and demand can be easily aggregated for negotiating discounts. Thus, eTailing and eMediation not only interfaces the market, but also enables them to internally work more efficiently. The globalization and deregulation of markets fortify the use of eMarkets and the technologies it necessitates and vice versa.

2.2 Enhanced Competition

In eliminating the information barriers and inefficiencies of exclusive and controlled models of economic exchange places buyers in the driving seat which leads to more competition among producers. The production and traditional mediation sector has four possible strategies in this new environment:

1. Adapt to the new competitive environment;
 - Accept competitive pricing.
 - Improve productivity and efficiency to maintain cost competitiveness.
2. Innovate to conquer market niches.
3. Try to control the market.
4. Exit.

Adaptive producers who accept competitive pricing will endeavor to gain cost leadership in existing markets by using improved technologies to increase productivity and eliminate inefficiencies.

Those producers who adopt an innovation or differentiation strategy will attack the market with new and increasingly customized products — thus increasing the potential consumption bundle on the industry level. However, new entrants will also constantly threaten innovation markets due to the fact that more market information becomes public in shorter cycles. Therefore, the duration of temporary monopolies will decrease eventually resulting in competitive equilibria.

Producers who prefer to invest in capturing increasing market power will have to do so on a global scale and increasingly across traditional sector boundaries to gain control of the value chain. This strategy will, at least in the short run, prevent such producers from deviating far from the competitive pricing scheme. As a result, a more competitive environment reduces prices for existing products due to productivity/efficiency improvements in production as well as competitive pricing in exchange operations.

Innovation, in the sense of quality upgrading, inventions or process/technology improvements, widens the consumption bundle within which existing products are substituted and leads to creative destruction and cost reductions. Thus inefficient and redundant over-capacity has to exit resulting in an increased aggregate total factor productivity.

2.3 Economic Growth

The combined effect of more efficient markets, productivity improvement and innovation leads to accelerating economic growth and increased aggregate demand.

2.4 Increased Household Income

Triggered by economic growth, household income will increase due to higher labor and capital productivity. In addition, expected lifetime incomes will increase due to higher earnings and decreased spending will allow households to spend even more than their current budget would allow.

2.5 Accelerated Economic Metabolism

The implementation of new information technologies not only expedites exchange processes between buyers and sellers, but also accelerates and integrates manufacturing processes as productivity and efficiency improves. Acceleration, i.e., increasing the tact speed of all processes in the economy, also feeds back into the expected lifetime income and spending (deflation tendencies) calculations of households and improves the returns on investment (ROI) calculations. Such changes in the expectations of market participants reinforce the dynamics of the system and, as a result, the metabolism of the entire economic system increases.

3. Implications of Digital Markets on the Forest Industry

eCommerce is no longer an option — it is now imperative for the core industry actors and allied industries. There is no way of avoiding this process since large businesses and government agencies already insist that all of their suppliers link into their eCommerce system as a condition for doing business.² In this sense the down-stream industries, such as the pulp and paper industry, are forced to adapt to the new environment. Co-evolving forms of business coordination and organization are ruled by their own dynamic forces, which are expressed by learning-by-doing, learning-by-using phenomena and coordination effects in the form of network externalities. Once a certain network standard is established it is costly to switch from the old to the new for both supplier and customer because new relation-specific investments must be made. It is thus optimal to buy into winning network relationship capital as soon as a critical mass of network participants has been reached in order to benefit from the “early birds catch the worms” effect.

In the following paragraphs we will describe the most important changes that can be expected from the eBusiness model on the industry level by answering a number of simple questions.

3.1 What is the Value-added?

Electronic commerce is already fulfilling its promise. eMarket places that connect buyers and sellers are up and running in many product categories and are creating value. The key to understanding the dynamics of IT and eCommerce is the identification of the value they add to a particular market. The speed of diffusion and the final market size of eCommerce depend upon the relative value it adds. The rewards of eCommerce are split in the following three ways: (1) elimination of inefficiencies, (2) productivity increase, and (3) informed markets.

² It is estimated that up to 70% of EDI links are established primarily because a major corporate or government customer specifies doing so as a term of contract (see, OECD/ISO, 1996).

3.1.1 Elimination of inefficiencies

Transaction and information costs are minimized and transactions are accelerated. Universal access, flexibility, almost unlimited space at low cost and actuality of Internet resources increase the richness of information for and about market participants with a feasible 24x7x365 trading advantage (see, Table 1).

Improved knowledge of future consumption trajectories due to better forecastability of demand will help to substantially improve industry-wide planning and coordination. This will help to minimize capacity reserves and reduce expensive over-capacity for the entire industry resulting in a less volatile market.

Table 1: Areas of competitive advantage of the eCommerce business model.

	Buyer	Seller
<u>Information cost</u>	Web site procurement posting. (e)search agents. Inform to find what you need. Search for online quality tests and additional product information. Interactive products (design on Internet and let produce).	Self-presentation on a vendor Web (with/without online ordering). Bring on new buyers economically. Web advertisements to increase span. In control by selecting target buyers. Get to know the current and potential customers as individuals. Online benchmarking with competitors.
<u>Transaction cost</u>	(e)purchasing agents. Bid, buy or negotiate an (e)deal. Order online. Track your order. Pay your bill paperless and maintain a personal account. Home delivery (decrease in km (person hours) per product).	Choose how to sell (e.g., auction inventory). Streamline and focus sales and marketing. Create a personalized, private online relationship with each buyer at low economic cost. Market processes are integrated with all other operations. Online consumer service.

3.1.2 Productivity increase

Information routines can be automated leaving human capital more time to concentrate on value adding processes. Freed resources will also help to increase the sophistication of market participants. Increased sophistication combined with new forms of communication allows the formation of superior organizational solutions within and at the interface of extended eEnterprises.

Improvements in supply chain management, especially the increased reliability and changed economics of raw material supply, will allow further exploitation of economies of scale at the mill level leading to increasing capital productivity at the aggregate industry level.

Therefore from the input side, total factor productivity can be expected to increase by using less but upgraded personal resources and by further exploiting increasing returns to scale in production.

Total factor productivity improvement can also be achieved by upgrading the output measure. The Internet significantly increases the span for both buyers and sellers, which allows producers to tap new sources of revenue and retain functioning channels in an increasingly competitive environment. New revenue sources can be tapped by expanding into formerly untouched markets in terms of geographic and product space, levying transaction fees for the use of electronic infrastructures, and brokering customer interface to third parties with value-added services. The customization of customer relations (e.g., preferred vendor status) can be achieved through e-supported or automated interaction and down-stream process integration.

3.1.3 Informed markets

A necessary precondition for markets to become more efficient is to eliminate information barriers. Upgraded information is not only important for everyday tactical decision support, but also for the development of strategic decisions. Informed Markets (IM), industry specific information brokers and a myriad of others, provide information services, such as: industry/product specific search engines; specific search catalogs on products and vendors; follow prices (Internet, spot) online; read up-to-date industry news; read industry analysis and editorial columns; seek paper terms using an online glossary in multiple languages; check personalized industry reports and do benchmarking; research and compare global paper industry specifications; connect with other professionals; online employment market; links to other industry sites of related industries; initiate and inform about industry programs and alliances; personalized news service; alerting people to activity in the product(s) they are interested in; plan and be alerted about all industry events; and finally participate in discussion fora.

Despite the many services, they are available free of charge on the Internet and are valuable in attracting attention for a revenue-generating product.

3.2 What Are the Different Models of eCommerce?

eCommerce is a young term and its users have yet to come to a convergent concept.³ It is therefore worth giving an overview of the different types and forms of eCommerce (see, Table 2).

The most common distinction made is *by the type* of market participants, i.e., business, consumer, government (see, Figure 2).

³ www.e-comm.at defines eCommerce as follows: *Any type of commercial transaction, where participating parties communicate electronically and by direct physical exchange.* This is probably one of the widest and most used definitions, but it does not capture the transformational effect on all business processes.

Table 2: Structure of eCommerce in the forest industry according to type of interface, market participant and exchange.⁴

eMediated or eFacilitated		eDirect	
B2B	B2C	B2B	B2C
<p>eAuctions packagingexchange.com efibre.com paperdeals.com, forestweb.com e-wood.com paperandfilm.com</p> <p>eExchange PaperExchange.com papertrader.com Papersite.com holzboerse.de TheFiberExchange.com talpx.com</p> <p>eNegotiation AccessPaper.com fibermarket.com imark.com <i>ePinboards and search engines</i> timberseek.com verticalnet.com pulpandpaper.net</p>	<p>eCatalog furniture.com</p> <p>eMatching</p>	<p>Inter-company supply chain commerce over the Internet Americanfinepaper.com ns.onego.ru/bumex/</p>	<p>eCatalog ikea.de</p>

	Business	Consumer	Government
Business	B2B	B2C	B2G
Consumer	C2B	C2C	C2G
Government	G2B	G2C	G2G

Figure 2: The eCommerce matrix.

⁴ The table is far from comprehensive and is only used for illustrative purposes.

The two most important eCommerce are: Business-to-Business (B2B) portals and Business-to-Consumer (B2C). Berlecon Research (www.berlecon.de) estimates the B2B market to be five to ten times larger than the B2C market. Intangible goods mostly rank high on the B2C Internet retail shopping sites.⁵ Smaller market places are Consumer-to-Consumer (C2C), such as Internet classified columns for used furniture, and Consumer-to-Business (C2B) eCommerce which is almost non-existent and restricted to the commercial collection of valuables. Business-to-Government (B2G) eCommerce mostly deals with government tenders for procurement, distribution of subsidies and, increasingly, with tax and fee collection. Government-to-Consumer (G2C) relationships are currently restricted to electronic guidebooks and information services on laws and governmental services.

Digital market places can also be distinguished by the *interface* of market participants. Buyers and sellers either directly communicate over the Internet or use third parties that provide mediation or facilitate contract-building services. Such third parties are known as virtual markets, virtual bookers, Vortexes, butterfly markets, eMarkets, eHubs, net market makers, or information-mediaries, hereafter called IMs. IMs are usually neutral to all parties in B2B models and in the B2C model the credibility of the IMs is maintained if they are consumer associated. In this case buyers use buying alliances as purchasing aggregators. IMs are also defined as agents that leverage the Internet to unite buyers and sellers in a single, efficient, virtual market place (Hagel and Singer, 1999).

3.3 What Are the Drivers and Inhibitors for IMs?

In many cases IMs are the shared digital infrastructure among competitors or consumers with the aim of improving market efficiency and to integrate buyers, suppliers, value added service providers and themselves as market makers. Their main value added to the market place is the wider span, richness,⁶ and lower communication and acquisition costs, as well as the 24x7x365 trading advantage. The emergence of IMs substantially decreases the length of time required for transaction processes. IMs provide online market information about prices, volumes and the geography of trade; reports and news on products and markets, electronic benchmarking, and many additional free services to attract a critical mass of customers to their web sites. Analysts can use the retained market information to achieve real time customization. Efficient customer response (ECR) is achieved by using consumer studies from the retained data.

In a B2B environment we encounter two different types of IMs: Vertical and Functional.

Vertical IMs (e.g., www.paperexchange) serve a vertical market or industry focus. They provide deep domain-specific content and domain-specific relationships. Vertical IMs typically begin by automating and hosting the procurement process of a vertical industry and then supplement their services with industry-specific content. Their success increases with greater fragmentation among buyers and sellers, inefficiency in the

⁵ The same experience was made by Minitel in France (10 years before the Internet emerged). Those intangible products can be grouped into entertainment, travel, newspapers and magazines, financial services, and e-mail.

⁶ Support of a full spectrum of prime and non-prime products.

supply chain, size of participants, additional free content and service, and further integration with allied industry IMs.

Functional IMs focus on providing the same functions or automating the same business process across different industries. An example relevant for the packaging industry is IMarks.com that focuses on buying and selling used capital equipment across different industries and other IMs focusing on logistics, maintenance, repair, and operation procurement. The Functional IMs success increases with the degree of process standardization and automation, complementing process automation with deep content, and the ability to deliver industry adapted solutions of business processes.

Anonymity, if demanded, is an additional advantage. eCommerce solutions also optionally allow users to have full control over information flows. For example, in eNegotiation buyers can deal with a custom-made selection or the entire universe of sellers. Therefore, the eNegotiation exchange model allows sellers to maintain the brand of and with their products. B2C IMs can help consumers to satisfy special consumer demands or IMs can efficiently aggregate or bundle demand, which is made visible to the universe of sellers.

IMs are flexible in creating revenue for their operations ranging from advertising, transaction fees, and membership fees to information brokerage and consultancy services.

More than any other industry before, IMs are ruled by economies of scale and standard setting. The market forces will thus allow only a few info-mediaries to survive. Similar to the experience in the software industry, IMs thrive for size and try to establish their own standards of information exchange thereby creating dependencies and monopolies. On the other hand, IMs will only maintain credibility if they are neutral to all parties.⁷ Policy makers or market participants will have to address this issue in order to turn IMs into some sort of non-profit organizations that are financed by fees.

There are still a number of unsolved problems related to eCommerce. Such problems are more prevalent in B2C eCommerce and are likely to limit its growth and hold it to 10–20% of the overall total in the near term. Legal and psychological barriers such as:

- security of payment,
- fraudulent merchants,
- privacy of personal data,
- difficulty and expense in accessing eCommerce merchants,
- inability to surf, and
- inability to make decisions in a world of information overkill,

might inhibit the rapid growth of B2C eCommerce.

In addition there are cost factors to be considered. The cost to the consumer, mainly the start-up cost for Internet equipment and computer education, inhibits the fast diffusion of B2C eCommerce. The search costs are usually considerable, despite the availability

⁷ Recently Amazon.com had to stop advertising activities on its home page in order not to lose credibility.

of search machines, because people do in effect surf more than performing efficient focused searches.

Today's eConsumer demographic profile is defined to be young, educated and belonging to a high-income segment. Forrester Research (1999) (www.forrester.com) argue that in understanding eCommerce demographic research should be substituted by technographics, where technophobia and technophily define the dividing line between a consumer and an eConsumer. However, technophobia has to be overcome and the Internet is to make it be a mass phenomenon if it is 'brain-dead easy' (John Laundry of Lotus) to use.⁸ Other important attributes of an Internet of the future that will be accepted by a wide demographic spectrum are convenience, choice, personalization, amusement, and savings. A characteristic and frequently cited as a spur to B2C eCommerce is the possibility of forming a one-to-one relationship between merchant and consumer which allows products to be customized. An alternative strategy of providing 'customization' is to support the consumer's choice from a huge (or almost all products including hard-to-find niche items) variety of products. However, if consumers are not supported they will get drowned in information and become confused and irritated anti eConsumers.

3.4 What Are the Market Places of eCommerce?

Modes of success in eCommerce also depend upon the number of participants and the duration of cooperating partners (Figure 3). Before establishing an eCommerce strategy it is important to identify the target market place.

Perfect markets are established upon the final interaction of two parties agreeing on one transaction. Goods and services are easily comparable and many suppliers compete. The competitive advantage is expressed in the price (e.g., www.paperdeals.com).

Supply chains, which are dominated by one or a handful of suppliers of a final consumer good, arise in an environment where goods and services are complex in their nature, difficult to compare, and the customer-seller relationship is more durable. The Internet allows for a cheap and flexible and thus more intensive interaction between buyer and seller leading to higher customization. In some cases, communication can be automated or product servicing be 'self-organized' (emerging in the packaging industry, e.g., 3C projects (Customer-Communication-Cartonboard) of www.mayr-melnhof.co.at).

Projects arise from the need for temporary collaboration among a limited number of participants. Projects are usually given a fixed budget and deadlines that must be met. The development of one central database for efficient coordination helps in saving time and costs. In addition, transparency among participants is increased (building a greenfield paper mill that is coordinated by an eCommerce system).

⁸ By the way, this is also a lesson from Minitel's experience, but Frenchmen certainly have their own *parlance*.

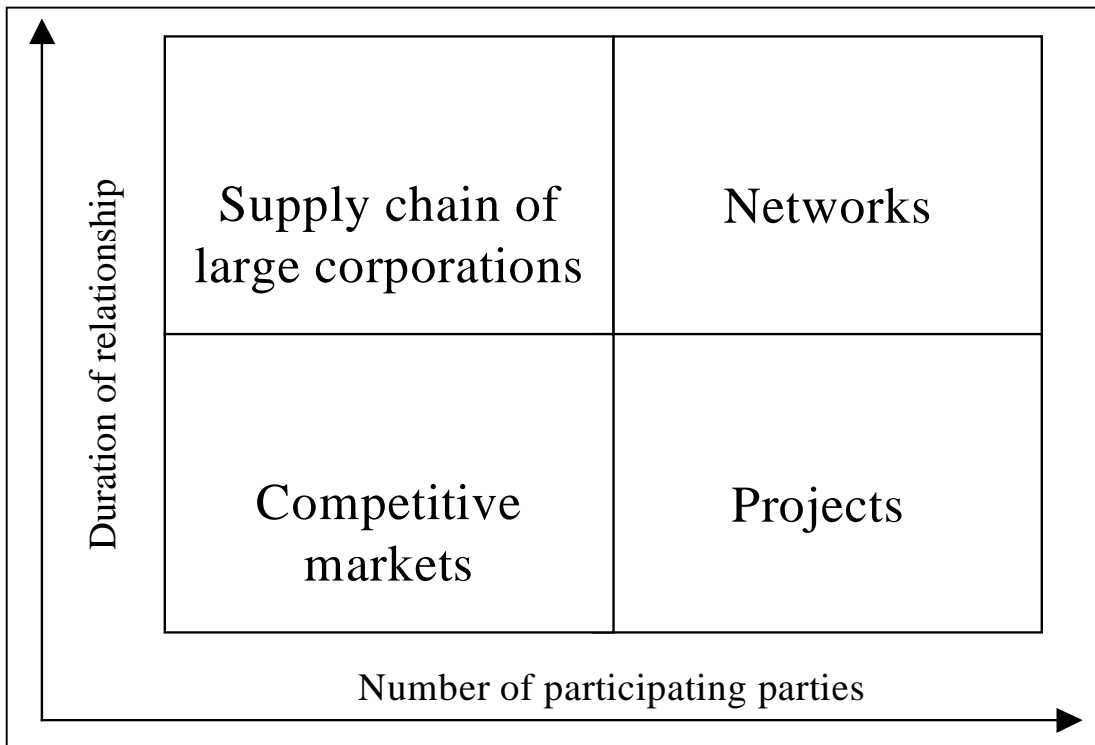


Figure 3: Defining eCommerce market places by the duration of relationship and number of agents. (Source: Adapted from www.mckinsey.com)

Networks in this sense are made up of a larger number of businesses that operate in a permanent interactive business relationship. In this segment the eCommerce solution provides a common platform for the implementation of integrated business processes among enterprises through a common industry standard. Such networks are usually more horizontal in their nature (suppliers of automotive components).

3.5 WorldPaper.com Versus WorldPaper.net — Is it Better to Manage or Own an eIndustry?

3.5.1 The value of owning WorldPaper.com

Most market observers and financial market pundits predict a more concentrated industry structure of the world’s paper industry (Figure 4: WorldPaper.com). The economic logic behind the recent and expected mergers and acquisitions (M&A) is that for a number of reasons mostly related to institutional inertia and wrong incentives that are prevalent in these markets, the stock market usually rewards mergers. It is believed that in the long-run giants can eventually maximize the profit stream by monopoly pricing and in the short-term cut costs by exploiting increasing returns to scale in sales, distribution and support activities and, more importantly, handling over-capacity and transferring capacity to gain benefits from machine specialization.

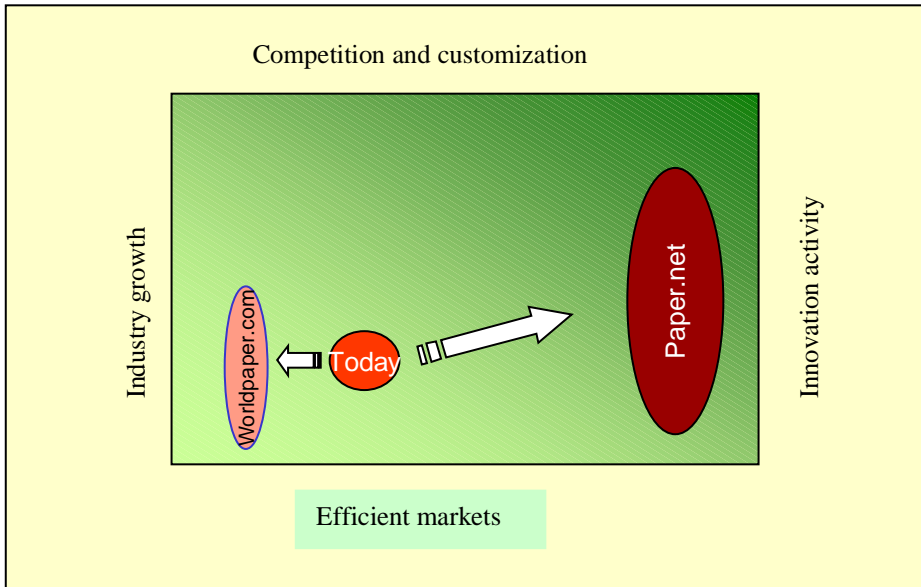


Figure 4: *The egg of Magdeburg. The main force factors — Consumer choice (information), competition, innovation and industry growth — pull the industry either towards the networked industry structure (Paper.net) or towards the concentrated industry structure (WorldPaper.com).*⁹

However, the empirical fact that numerous studies document is the failure of most mergers in absolute and relative terms and it becomes increasingly doubtful whether M&A will make the industry more competitive and financially more sound. Nevertheless, these well-known facts do not dampen the excitement of shareholders for new waves of mergers and acquisitions in the pulp and paper industry. According to The Economist (1999) the paper industry is regarded as one of the world's most fragmented resource-based industries, with the top ten groups controlling only 25% of the output. Likewise, the TAPPI (1999) futurists group in their most recent publication call scenario 3 'World Paper, Inc.' with the expectation that the top twenty companies will supply 60% of global paper (mainly base sheet) requirements. The vision is that World Paper, Inc. is also allied or even fully integrated with several major chemical and machine building companies. A tailor-made intra-net makes sure that all activities, formerly separated by geography and time, are coordinated. And, of course, a long list of the M&A brokers, which are at the same time in an information and opinion collusion with the heavy-weights in the financial market, see the only way of cutting costs to be through consolidation and restructuring (e.g., CSFB, 1999).

3.6 Managing Paper.net

The drivers governing eBusiness might push the industry in the opposite direction towards Paper.net (see, Figure 4) where, in the extreme case, mills are independent, but more open nodes in large inter-industry networks provide increasingly customized value to end-users. Such values involving the paper industry could be activities, such as, news and entertainment in multi-media format, eFunctional foods, office communication, or

⁹ The intensity of color reflects the intensity of all four forces at any particular point.

advertising, consumer information, and knowledge building. Support activities and auxiliary primary activities of the firms' value chain that are governed by economies of scale are outsources to independent agents within the industry network.

Adaptability and foresight are the most important ingredients for achieving competitive advantage under the new eCommerce paradigm. Firms must adapt to the:

- increased *speed* and actuality of information;
- increased *span* of customers and sellers;
- increased *richness* and detail of useful information *for* and *about* all market participants; and
- emergence of *consumer affiliated* information-mediaries and novel selling methods (auctions) shifting traditional market powers.

Apart from the advantage that a network strategy of small independent units is an organizationally superior model exploiting economies of scope and association, in a business environment of increased customization large companies suffer from serious internal organizational problems. The theoretical and empirical literature on the principal agent problem and on optimal incentive contract issues is vast and conclusive that true competitive solutions are pareto-superior. Thus, the agency cost to manage WorldPaper.com can be expected to be larger than the benefits from the merger compared to a more atomistic producer structure that is embedded in an eCommerce environment. In addition, the advantages of overhead- and transaction cost savings under a more concentrated industry structure diminish when markets become more efficient and better informed. Under such considerations, the only benefit that remains is the enchanting feeling of being the biggest and the only one.

3.6.1 Efficient markets

Paper markets are becoming more efficient in the sense that on the one hand their information and physical operations are conducted more efficiently and, on the other that suppliers gain a closer alignment with customers and partners. At the same time, competition among producers is maintained or even enhanced. For the first time, it becomes technically possible to treat the consumer (customer) as an individual allowing for predictable demand based on utility maximization calculations (at least for consumption goods and services). In the new economy there is considerable competition to access and capture consumer information. Understanding, monitoring and predicting consumer behavior becomes an increasingly important asset in a world where work and innovation readily need to match and anticipate new and increasingly more customized demands at affordable prices. The result of improved predictability is a reduction of over-capacities, through avoiding future redundant capacities and an increased chance of successfully exploring niche markets.

The pressure towards mass customization, combined with new possibilities for information exchange between and within businesses, has a dramatic impact on the forms of value creation of networks participating in the eEconomy. Global competition drives work that is performed from a variety of locations and suppliers, all of which are increasingly open and networked in a virtual business community seeking the best deals

for its customers. Due to their open nature, digital markets can be searched and analyzed in milli-seconds reducing business intelligence expenditures to a fraction of the former. Openness not only strikes the existing balance of market power between consumers and suppliers, but more importantly has emerged as a strategy with many of the most successful eVentures granting business partners and consumers unparalleled access to their inner workings, databases, and even personnel. The resulting networking and integration benefits help to substantially decrease costs across all activities in the supply chain through increasing returns, enhanced knowledge spill-overs, automatization and self-organization of working tasks and routines.

3.6.2 Competition and customization

It should be acknowledged that the (e)Enterprise will soon participate in a radical re-definition of industries, markets, and the global economy itself. Markets are becoming both more complete and global. More complete markets increase competition among existing businesses, increase the probability of substitution from emerging new products from advances within and outside the industry, and information constraints are gradually disappearing. The globalization of markets also leads to more competition among businesses that can make use of market size effects by reaping economies of scale. As a result, competition becomes more intense on both the cost and differentiation dimensions.

The nature of competition as well as business strategy and competitive advantage in domestic and international markets change. The Internet opens historically grown proprietary relationships, redefines relationships between the paper sector and its allied industries, and allows small Internet start-ups to address international markets. By re-engineering interfaces for new business relationships new entrants set new standards. The enhanced competitive environment places pressure on individual market participants to narrow their competitive scope (cost or differentiation focused). Industry-wide, more fragmented and longer value chains can be expected. Firms that are focused on their competitive advantage will adopt out-sourcing and partnerships as preferred business relationships. Supported by information technology solutions, cooperating businesses will make use of network effects. Many times newcomers build alliances with formerly competing or independent firms occupying new territory in the industry network to create a new competitive advantage for the entire supply chain.

Traditional intermediary functions are replaced. Traditional retailers are uneasy about the question of whether widespread 'disintermediation' (producers selling directly) is likely to happen in the very near future. Strategically similar to the economic logic of mergers, the Internet economy currently mainly focuses on closing traditional retail outlets and cuts or eliminating the expenditures of the sales, distribution and head-office labor force. Today, the Internet can level the competitive playing field by allowing small companies to extend their geographical span and secure new customers in ways formerly restricted to large global players.

As information distances shrink (Figure 5) through new forms of communication and cooperation, large corporations will find the solution to organizational deficiencies in breaking the value chain into more independent agencies interconnected in a looser, but strongly networked structure of extended enterprises. In firms that are integrating into one business incentive, contracts and competition will increasingly substitute orders and

work plans ensuring high quality labor and live-time learning on horizontal and vertical dimensions. In a process of reconfiguration and self-organization market participants can find flexible solutions to constantly changing demands and innovations and constantly changing determinants of competitive advantage. Monolithic giants, on the other hand, will find themselves constantly proudly presenting solutions to yesterday's questions. They lack the ability to adapt quickly enough to the changed environmental conditions due to their internal inefficiencies and structural inertia.

The need for more flexibility might counter the economic need of the paper sector to move geographically closer to cheap raw-material supply. Through learning-by-doing and learning-by-using the industry is forced to geographically combine the consumer (demand-pull), innovators (R&D sector), and production in order to exploit network externalities from the historically grown network.

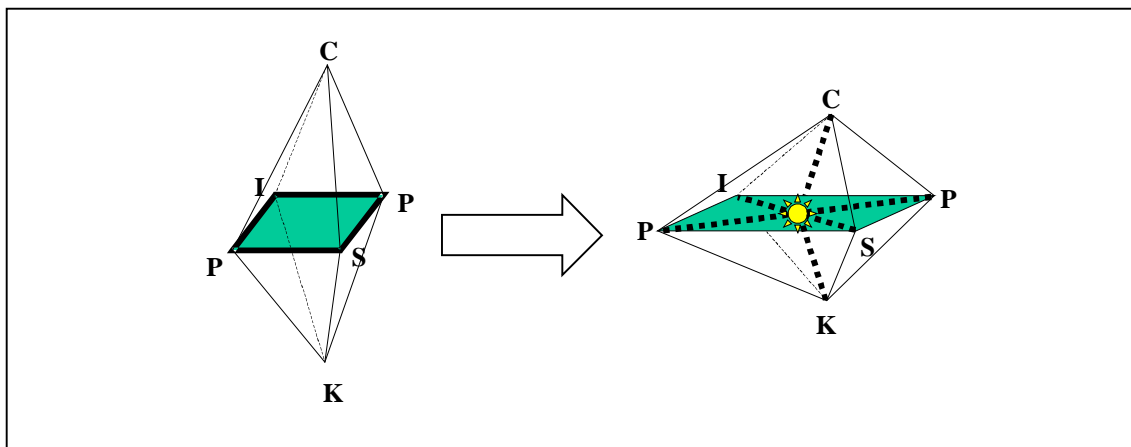


Figure 5: Information Distances between Market Participants (C = consumers, P = industrial producers, S = suppliers, I = innovators associated with the industry, K = capital market). In the left object (traditional retail model), information flows occur mainly on the surface (the thickness of the line reflects the information flow intensity). In the right object (eTailing model), information concerning all 'competing' market participants is centrally available with an IM (sun).

3.6.3 Innovation

Innovation spurs if market expectations are high for innovative new products, processes, and organizational solutions within the industry and the institutional environment is conducive. Historically, due to the lack of market information and the existence of information asymmetries, efficient venture capital markets supporting technology firms (projects) took a long time to develop. Shrinking information distances between all market participants drastically reduces the capital market information costs to fund innovative projects. Although the individual innovators might not see large changes in the aggregate, significantly more innovation will occur due to new entrants that are attracted as market information becomes more public and the venture capital fund

thrives. Thus, Bertrand competition will continue to be the economic model dominating research and development (R&D) races.

The process of R&D itself will gain productivity due to improved communication and networking capabilities. The benefits, largely due to globally networked R&D projects (parallel and in series), rapidly diffusing technology and knowledge, increasing stocks of knowledge (looking over the giants' shoulders model), and more efficient organizational structures lead to more differentiation and customization of paper products. At the same time, however, competing new technologies (e.g., eBook) will threaten paper-based products with substitution.

Consumers, on the other hand, can choose among a wider basket of goods due to more global markets. In the networked eEconomy market power shifts to the consumer by giving the consumer (entities at the end of the value chain) more choice leading to competitive prices, increased customization and radically reduced mediation mark-ups. Eventually, consumers will learn to deal with wider product choices as they are supported by eAgents, which will further push the innovation frontier.

3.6.4 Industry growth

The model cycle (see, Figure 1) is closed by accelerated aggregate industry growth. All of the factors discussed will most likely increase the competitiveness of most paper products, although some will suffer from creative destruction by superior products, and thus explain the higher growth of the entire paper products sector.

However, currently unforeseeable new types of market imperfection might hamper this general tendency. There is some historical evidence of the possibility that changes in the conditions of access to networks and connectivity, technical standards, institutional arrangements and the establishment of new types of market power could pose barriers to accelerated growth.

3.7 Increasing Returns, Market Structure and the Value of Asset Ownership

As already discussed at many stages in this report, a key implication of eCommerce is its impact on industry structure. This question can best be investigated by having a closer look at the possible changes in the underlying economics of individual activities of paper firms.¹⁰

As illustrated in Figure 6, certain activities, such as, procurement (dotted line), can either (1) be organized under one umbrella in a merged company (M&A), or (2) be partly outsourced in a networked procurement system of independently operating enterprises within a B2B IM (B2B Network). Independence is symbolized by separated manufacturing activities (M)-(M) in the B2B network structure, whereas within the

¹⁰ In other sectors, such as, car manufacturing (online exchange of car-parts DC, GM, Ford, Nissan, etc.) or retailing (e.g., GlobalNetXchange), outsourcing of former core activities become even more efficient through online exchanges and integration.

merged firm both manufacturing activities (M-M) are subordinated to one horizontal layer as can be seen in the value chain diagram.

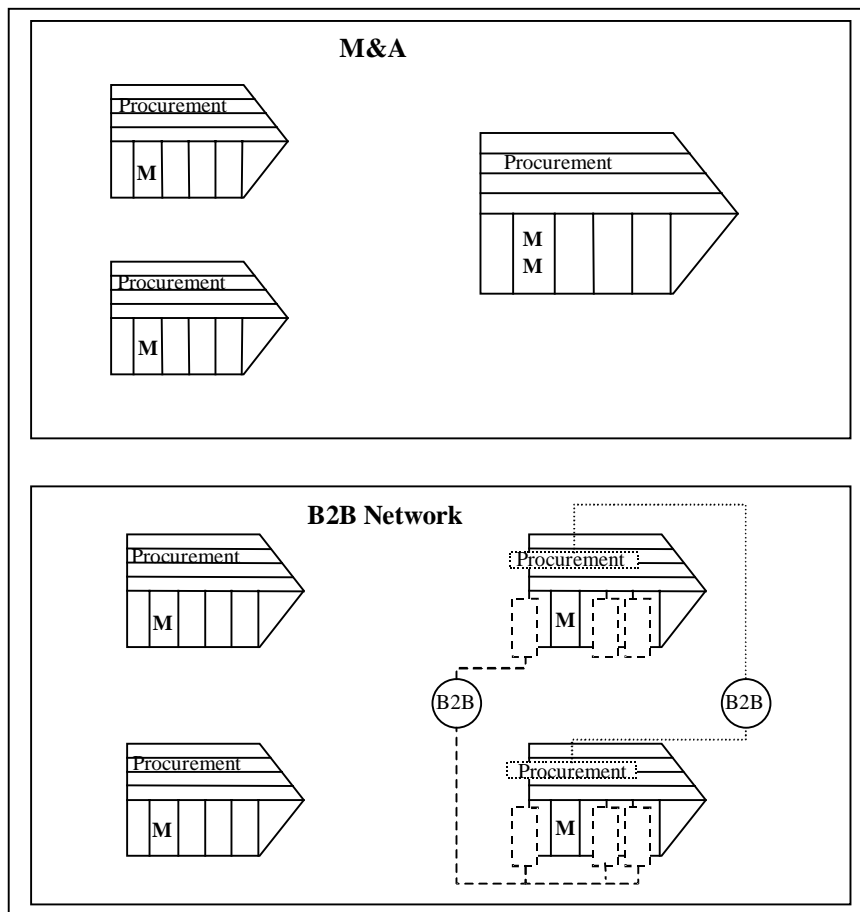


Figure 6: Simplified organizational chart of firms' value chains in the scenario of the building of an M&A or B2B network.

Despite the fact that along the paper making chain the possibilities for outsourcing are not as ample compared to other sectors, there is much room for organizational change within the industry. The question of outsourcing and the organizational structure of production are mainly related to the existence of scale economies or self-reinforcing mechanisms¹¹. These forces can be prevalent in geographic and activity space. The second theorem of welfare economics asserts that in non-increasing returns to scale any Pareto-optimal allocation can be decentralized — suggesting an atomistic supply structure. However, if economies of scale can be expected the market will be concentrated. Increasing returns occur when the average cost per unit output of an activity or bundle of activities decreases with an increase in total output involved (see C_o curve in Figure 7).

¹¹ A good example of a self-reinforcing mechanism of an Internet choiceboard is the collection and analysis of customer data resulting in targeted customized customer feedback.

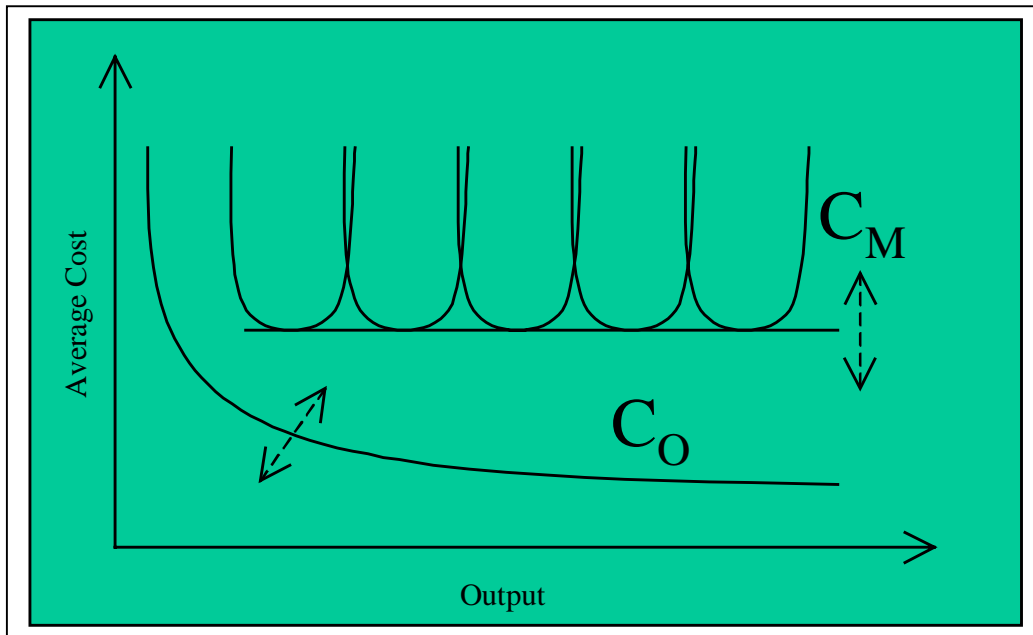


Figure 7: Average cost curves of manufacturing (M) and support activities (O) as a function of scale of production.

Two questions now arise:

1. What are the activities from which economies of scale can be expected in an increasingly wired world?
2. Which business model, M&A or B2B network of independent units, minimizes total costs.^{12,13}

With respect to the first question, we provide a detailed analysis of all the activities of a pulp and paper firm separately in next section of this paper. The second question, on the other hand, will be attacked immediately and can best be answered by having a closer look at the cost functions of merged or networked firms.

Let us therefore consider a small micro-economic model to understand the implications. For simplicity we assume that manufacturing (M) is one activity and all the other activities, support activities, inbound (outbound) logistics, and marketing and sales can be grouped in another activity category (O). Figure 7 provides a graphical representation of the average cost functions of those two activities, which in simplifying assumptions exhibit the following functional forms:

$$c_M = (a + by)y \text{ — cost function of the manufacturing activity (M);}$$

$$c_O = (c + (y + d)^2)y \text{ — cost function of all other activities (O).}^{14}$$

¹² If the B2B model is superior, concentrated industry structures would eventually be crowded out, even if they are already established.

¹³ *Ceteris paribus* condition. Assuming that innovativeness is the same in both models.

¹⁴ Figure 7 only shows the convex part of the proposed quadratic function.

The analytical expression of interest is the most efficient scale (MES). We compute the MES by letting the marginal cost curve intersect with the average cost curve, which yields, $y^* = \left(\frac{2d - b}{2} \right)$. From this expression we see that the MES increases with increasing returns to scale in manufacturing (the enveloping line of c_M tends downward ($b < 0$)) and positively related with d , which is only the shift parameter of the quadratic average cost function along the abscissa. Depending on parameterization we can expect different constellations of the cost functions. Let us assume for simplicity that manufacturing exhibits constant returns to scale ($b=0$), then there are six possible ways how the average cost functions of all other activities (c_o) intersect. We have reduced the number to three possible constellations of the average cost function that are of interest (see, Figure 8).

- I. The average cost curve of M&A is strictly above the cost function of the networked industry (Net). The networked business solution is superior on all scales.
- II. If only a few firms join a B2B network, the average cost is higher than that of the merged firm and the eCommerce solution is sub-optimal. However, with increasing output network structures are becoming more cost competitive. Under this cost curve scenario consolidation to a certain point increases cost competitiveness. However, consolidated companies need thereafter to try and create joint B2B portals in order to be able to further decrease costs. We are currently witnessing a similar situation in the supply chain management of the automobile industry.
- III. On a smaller scale the average cost of the networked business model is still superior, but with increasing the scale merged firms become more cost competitive. However, if a large number of firms join in a common eCommerce venture, the networked model again becomes more cost effective. In this situation an unbundling of merged structures might be necessary.

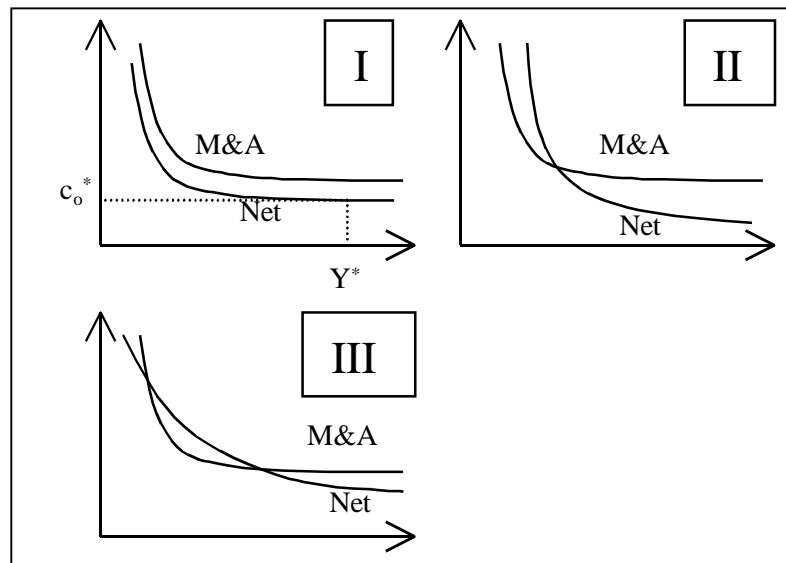


Figure 8: Intersecting average cost curves of merged (M&A) or Net-worked (Net) firms according to scale.

4. The Pulp and Paper eEnterprise

The Pulp and Paper Industry — a natural resource based capital intensive and vertically integrated industry — faces numerous business challenges in today's fast changing global market place. Facing excess global capacity with long investment cycles, price fluctuations, large and volatile inventories, rising costs and uncertainty of raw material supply, global macro-economic uncertainties, and serious threats of substitution, the pulp and paper producers are struggling to satisfy the financial markets. In addition, mergers and acquisitions have created an industry defined by new companies — one that is more global than ever before. In such rough waters, it is critical for pulp and paper producers to focus on the optimal product mix, while keeping an eye on costs and continuing the transition from a commodity supplier to a strategic partner within an extended industry web serving increasingly demanding customers. Thus, pulp and paper producers must invest in linking complex internal processes to the rest of the world. The eBusiness model erases the boundaries between separate entities that comprise the supply chain. In an eBusiness, the entire supply chain becomes a virtual enterprise, a true value chain in which all resources leverage the Internet to communicate and collaborate effectively to provide and gain access to information instantaneously.

eCommerce encourages streamlined business processes, flattens organizational hierarchies, involves a networked labor force, and enables inter-firm collaboration. The way value chains work will have to be reorganized from within otherwise new superior business models will substitute them. The ability of firms or industries to reorganize in this new environment will crucially depend upon the flexibility of the organization, the adaptability of human capital, and on continuing efforts to innovate. The capability to mutate and adapt become the most decisive factors for competitive advantage under these new environmental conditions, where customers are less product takers, but becoming product makers.

eBusiness is affecting every organization in advanced economies and companies that slowly embrace new technologies may soon face competitors that threaten their very existence or vital profit sources of their business. Successful new ventures within the pulp and paper sector and its allied industries will have to embrace the principles of openness, connectivity and strategic integration, for instance:

- Open up the enterprise to include partners, suppliers and customers create mutually successful solutions.
 - Forge ahead with strategic partnerships and alliances, which are efficiently enabled through enhanced communication and shared information.
 - Build stronger, longer-term, mutually supportive relations with customers in pursuit of improved customer service, cycle time reduction, and reduced costs.
 - Develop long-term strategic relationships with key suppliers, thereby leveraging purchasing power and tightening the supply chain.
 - Implement joint long-term R&D projects to allow for co-evolution.
- Connect the extended enterprise through a universal electronic medium to the extended supply chain, integrating business processes and people across physico-

geographic, cultural and time boundaries, thereby ensuring efficient workflow and higher productivity with lower operating costs.

- Integrate technology, processes, and human resources to align with the evolving stream of strategies. Provide management with meaningful up-to-date information to support decision making at both the strategic and tactical levels.

Sharing resources across company borders in an environment of fast changing markets in competitive environments calls for a major re-thinking of business culture and norms of interaction. This means that substantial resources will have to be invested to create a business climate of trust.

In the following paragraphs we will discuss all of the activities of a paper firm's value chain with respect to eCommerce implications.

4.1 Primary Activities

IT solutions meet the task of manufacturing companies by connecting end-users directly with suppliers and automating the acquisition and management of goods and services throughout the supply network. The immediate challenges of today's market place for individual companies include price pressures, reduced lead times, increased order complexity, and demanding quality requirements.

In the extended industry model, eBusinesses are able to schedule and plan material and distribution requirements for multiple organizations allowing a global visibility throughout the supply chain thereby resulting in shorter fulfillment time. Integrating manufacturing and distribution into a single unified planning process across the extended enterprise creates supply chain planning, which allows companies to plan finished products, intermediate assemblies, and purchased items for all facilities in the supply chain. Material plans for feeder plants and distribution centers automatically consider requirements originating from any number of other facilities. In this respect, scale is achieved by the extended enterprise concept and the positive feedback manifests itself through automation.

Companies can also plan and optimize the material requirements for their distribution network, including warehouses, distribution centers, or any location that transports products. Since a key goal of an eBusiness is to leverage the Internet to create a virtual extended enterprise — to expand markets, improve efficiencies, and retain customers — a business can also include customer and supplier inventories in the supply chain planning process. Enhanced communication and collaboration within the enterprise network will facilitate the formation of flexibly shared human resource pools.

4.1.1 Inbound logistics/transactions

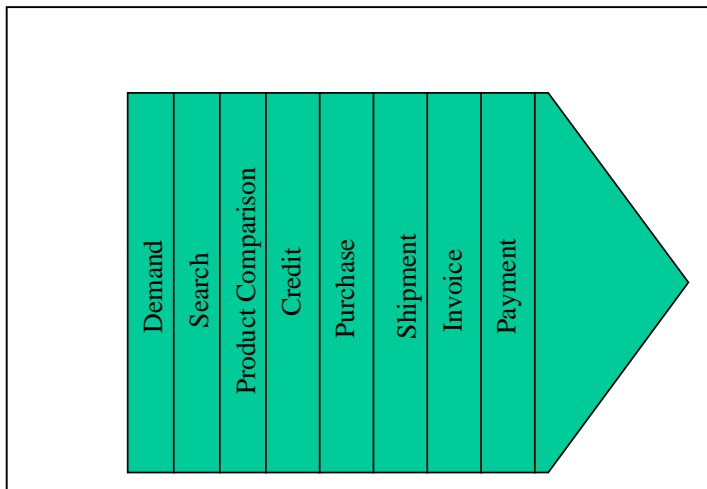


Figure 9: Steps of the inbound transaction chain.

Internet commerce exchange connects buyers and sellers directly, providing support for the complete transaction chain, from market and price discovery to financial settlement. Purchase orders are issued electronically after eAuctioning or eNegotiating and electronic order status, payment procedures and other standardized business processes are returned from the suppliers. IM either supports pulp and paper producers in all of these steps or even take over full responsibility of the entire task altogether by benefiting from economies of scale through specialization. An optimization of inbound transactions and increased reliability of procurement not only helps to decrease interaction and transaction costs, but also helps to significantly reduce the need for large raw-material stocks by adopting a more efficient ‘just-in-time’ inventory system. The faster and more reliable an input can be ordered and delivered, the less need for a large stock of raw materials. In the case of fiber supply, additional support technologies such as remote sensing, GIS, and GPS-controlled operations and logistic systems, allow forests to be treated as a standing stock of raw material. If these technologies can be implemented in agreement with the forest owner community, eCommerce will very quickly lead to mutual benefit.

4.1.2 Operations

By driving the manufacturing stage to increased electronic integration of internal and external logistics and processes, internal operations will transform to a self-organizing and self-servicing mode by removing layers of bureaucracy, redundancy, error and inefficiency through:

- *Manufacturing control*

Balancing and optimizing inventory and material supply with the committed or forecasted customer demand within the extended enterprise.

- *Manufacturing execution*

Providing the link between the physical process and the supply chain through the management and planning of factory floor work instructions, automated data acquisition, factory floor data collection, trim optimization, reel and roll processing, sheeting, quality management, product labeling, bar coding, real time and historical process analysis and reporting, grade costing, and warehousing.

- *Integrated quality control*

An integrated laboratory information management system and in-process quality management facility that is integrated into the goods receiving manufacturing and finished goods processes and sales operations.

Many support and even core activities and processes can be out-sourced or partnered (e.g., servicing roll-bearings with a direct data connection with the service partner) leading to increased cost savings and risk sharing. In this respect, operations are just one working step within a complex network operating under a common brand.

4.1.3 Outbound logistics/transactions

The benefits concerning outbound transactions and logistics of eBusiness models are as follows:

- Improved ability to more accurately forecast demand reduces inventory costs.
- Elimination of internally inconsistent orders, and errors in matching the order, receipt and invoice.
- Significant reduction in the time required to correctly process purchase orders.
- The producers can now economically handle relatively small orders themselves — increased shipping costs must be compared to traditional distribution costs.

Inventories are usually large in the paper industry. As businesses move to ‘built-to-order’ processing and increasingly to just-in-time inventories, inbound and outbound logistics that are supported by a common EDI system are crucial. Demands of final consumers and demands from businesses at the end of the value chain for fast order fulfillment and the ability to track in-time all steps in the process put additional pressure on a fast implementation of B2B eCommerce systems. In fact, one of the great opportunities for an eBusiness, which is located at the end of the value-chain, is to eliminate the direct logistics responsibility altogether. This will mean that the pulp and paper producers will have to adapt to such changes, as they are located more at the beginning of the value chain. By passing sales order demand directly onto the supply source — supplier, distributor — the customer can receive their products directly without the selling company taking possession of the goods. Capital and knowledge shortage combined with economic superiority of the outsourcing model has meant that most web-sellers allow functional IMs to take care of order fulfillment (Ernst and Young, 1998). In some cases these logistic companies take on not only the task of shipping but also warehousing, packaging, customer support, and even new tasks such as collecting taxes (KPMG, 1997).

4.1.4 Marketing and sales

The Internet is an efficient tool for offering customers personalized products and services by integrating and expanding the existing marketing infrastructure. Through a central database on the Internet all customer related data is stored and shared across the organization. Customer histories on transactions combined with personal details allow targeted campaigns, including personalized offers and special discounts. Marketing campaigns are executed through multiple channels, which are fully integrated and optimized according to the target groups' profiles. Resulting from improved forecastability of demand, backward integration along the supply chain can be improved. Savings gained from efficiency improvement can be used to increase the span.

It is less expensive to maintain a cyber-store front than a physical one because it is always open, has a global market, has less variable costs and longer hours. Duplicate sales and inventory costs are eliminated exclusively for eCommerce merchants who maintain one store instead of many – a typical example of scale economies.

Capturing and processing orders in a traditional business is error-prone and labor intensive. But, more importantly, these are non-value-added activities — they increase the overall indirect cost of products and services without providing any benefit to the customer or the business. One immediate benefit of the eBusiness model is that it leverages the Internet to streamline most routine activities and ensures that the information is available to all relevant systems both inside and outside the company. Using self-service capabilities and hosting the order processing on the Internet puts customers in the driver seat and lets them custom configure products to their own unique requirements. Because the order entry process (preferably on the Internet) is integrated with the enterprise systems in an eBusiness, customers know immediately when they will receive the product. The customer service representative can promise a shipment and delivery date based on the information available across the inventory and other systems, or customers can initiate the shipping process themselves and use the Internet to check on the delivery status. The result is lower cost for both, faster order entry with fewer errors, and more satisfied customers.

By placing the necessary information online in an accessible format, electronic commerce merchants greatly increase the efficiency of the sales process. As a result, even when customers complete a transaction in the traditional way, they frequently know which product they want to buy, although in this case the cost is shifted to the consumer. However, the customer must no longer trust the sales man, but rather make their own judgement based on his/her (re-)search and decision rules.

The brand with a certain product can be maintained through eBargaining solutions.

4.1.5 Services and customer information

As much support as possible is available online so that customers are able to solve their own questions. Consumers can access (formerly secret) company databases and online smart manuals, which are always up-to-date and are multi-media supported. Consumers can readily provide feedback on product satisfaction and reclamation. Instant and abundant feedback helps to improve the product and gives ideas for product

innovations. Writing an email is almost costless and impersonal, thus permitting more customers to contact their suppliers. This significantly cuts costs while generally improving the quality of service by establishing a new producer-customer relation, in which both gain largely from the fruits of an open system.

The supplier is able to cut costs and make better forecasts about customers' needs, while consumers gain from cheaper products and services combined with a 24x7x365 upgraded service.

4.2 Support Activities

4.2.1 Strategy development

There are numerous examples in the forest industry illustrating that strategic planning is less about analysis but rather the one-time gut feeling of a charismatic CEO. eBusiness and electronic integration of the processes of the firm (industry) improve the ability and transparency of corporate strategy building by using decision support tools. An eBusiness continuously refines its competitive strategy using business intelligence about its customers, the effectiveness of its campaigns, its suppliers, and internal processes and operations.

Strategic enterprise management is a process that needs to look at the present and the past as they set course for the future. The task is to synthesize vast amounts of financial, manufacturing, supply chain, customer service, and human resource information at any point in time — encompassing real-time operational data and warehouse information, as well as leveraging external business data (see, Table 3). Systems tools based on real-time and historical data allow the quantification of future scenarios, which help to re-tool business strategy for operations, manufacturing, and the supply chain as necessary in order to achieve the optimal effectiveness based on desired outcomes. In this way, the eBusiness model must be understood as an ongoing and iterative process consisting of setting corporate goals and objectives, linking strategic planning to operational execution, driving customer and product profitability, and increasing the shareholder value.

Table 3: Comparison of the traditional and eBusiness supply chain.

Traditional supply chain		eBusiness supply chain
Dedicated private networks.	INFRASTRUCTURE	Shared global network.
Shared as feasible within the company, only with great cost/complexity outside the company.	INFORMATION	Whenever demand requires, with worldwide access, to whoever is authorized.
Intra-company teams, with additional members added with difficulty and requiring customized administration.	TEAM	Inter-company teams, with global members joining and leaving quickly, securely, and with consistent, easy-to-use administration.
Physically controlled by connection to internal corporate network and/or simple user ID and password access.	CONTROL	Permission controlled, where data is accessible from anywhere on the globe, with sophisticated security for authentication and authorization.
Physical models and face-to-face meetings with limitations, such as travel and delivery of information.	PROCESS	Virtual product modeling and worldwide simultaneous engineering with integrated video conferencing, Internet phone links, and visual notes.

Source: www.ibm.com (16 December 2000).

4.2.2 Human resource management

Along almost all of the primary activities, productivity gains lead to labor savings and a shift in the structure to more qualified jobs. Cashiers and simple accountants, sales persons, stockers/warehouse people, and other lower-skilled workers will be substituted by electrons, webmasters, UNIX administrators, EDI support people, and programmers. As these personnel are highly skilled and part of the core business, such labor can no longer be regarded as part of a variable cost and thus will put limits on cost saving and change the style of management and human resource management of the entire business as a networked organization. It should also be acknowledged that the human capital of the firm is the basis of trust in the eEconomy.

4.2.3 Procurement

Switching to Internet-based eCommerce procedures can radically reduce procurement costs that span from expensive raw material hoarding, office supplies to travel expenses. However, equally important is the reduction of non-monetary costs, such as, speeding-up the process and logistics integration, controlling and reporting of all the processes on-line, the elimination of errors, ensuring compliance with internal and external norms, and the ability to handle smaller sales units profitably.

The eCommerce exchange is done through a customizable interface involving all of the primary activities. Increased efficiency of all procurement processes is reached through integration and coordination, freeing employees and customers from chasing paperwork and focusing on value-added activities by streamlining processes.

Smart agents can be used that are decision support tools to identify and materialize opportunities to rationalize the supply chain by automated negotiation and search capabilities.

There is the possibility of teaming up in the so-called Leveraged Sourcing Networks (LSN), with accelerated time-to-transactions and aggregation benefits. An LSN is an Internet-based electronic market place that contractually combines the buying power of participating companies (one or more corporations and single small or large businesses) with similar purchasing requirements. This aggregated buying power is strategically managed by an info-mediary to create greater efficiencies, economies of scale and competitive advantage for participating buyers and suppliers.¹⁵ The combined procurement needs of each LSN group are sourced, resulting in umbrella purchasing contracts with suppliers kickstarting network effects. The network effects are not only improvements of internal and external commerce processes of buyers, suppliers, net markets and commerce service providers, but also the integration of commerce with all other activities of the firm. Transactions based on these contracts, as well as off-contract spot buys from suppliers sourced through the network, are then conducted through a conventional direct B2B eCommerce platform.

The result is a global or regional eCommerce infrastructure that provides cost saving and revenue opportunities for businesses of all sizes both horizontally and vertically. Traditional corporate purchases are still cumbersome and costly involving a paper-intensive request, approval and order process involving re-keying information, lengthy approval cycles, handling of checks, invoices and shipment notices, all with significant involvement of financial and administrative personnel which often results in delays, errors, productivity losses and missed revenue opportunities.

5. Conclusions

This report illustrates that eCommerce will have considerable effects not only on how firms do business, but also that eCommerce will bring changes to the workings of the entire industry and economy. In the following paragraphs we summarize the key aspects of eCommerce that are directly or indirectly of importance to the paper industry.

5.1 eEconomy

It should be recognized that in the near future all companies will be Internet enabled eBusinesses in a similar way that they are telephone companies today. Although the Internet is only a medium of communication, it has wide-ranging effects on how the entire economy functions. The Internet triggers self-reinforcing mechanisms that make markets more productive and efficient. Examples of self-reinforcing effects are the

¹⁵ There are also similar successful B2C models existing for aggregating individual consumers.

learning effects of decreasing transaction costs due to improved coordination, reduced signaling, and optimized information processing. These are achieved by expanding the network within which an individual's actions conform to adaptive behavioral standards and norms. The increased efficiency on the market level creates a more competitive environment on a global scale that forces the production sector to increase efficiency and productivity by adopting innovation strategies. All of these forces are enhanced by an increasing liberalization of markets leading to higher economic growth and higher household incomes, which in turn spur consumption and/or savings. Finally, on-line transaction and production processes will continue to accelerate and result in increasing the speed of economic metabolism. It can be expected that the new economy model will materialize if the counter-veiling forces of decreasing trust and a less conducive international political environment can be kept under control.

5.2 eIndustry

eMarket places that connect buyers and sellers are already creating value in a number of product categories in the pulp and paper sector. Although in most market segments the role of IMs is in its primordial stage, competition due to high expectations is already intense. The market for information in the paper sector is ruled by increasing returns to adoption, i.e., the more eCommerce is used as a new technological standard of trading and services and the larger the number of users, the larger the benefits of adoption for the users and for the IM. As soon as a critical mass of users is achieved the process erupts at an increasingly furious pace.

There is good reason that under the digital market paradigm the determinants shaping the competitive landscape of the paper sector must be redefined. The elimination of information barriers will lead to enhanced price competition, more flexible business arrangements, and the elimination of excess capacity through better planning and coordination will help make markets for paper products less volatile and profitable.

Ceteris bellum gerant, tu felix WorldPaper.com nube! (The others shall lead wars, but you lucky WorldPaper.com marry (merge)!) will not materialize and will not prove to be a successful and sustainable business strategy for many paper market segments. By unbundling the various activities that make up a paper company today, managing a network of papermakers and their associated industries will prove to be a more lucrative business. This will show first in sectors involving speciality paper grades, where innovation and special consumer demands are more important than the width of the paper machine.

It can be argued that if, in the long-run, agency costs to optimally manage WorldPaper.com are larger than transaction mark-ups under the perfect competitive environment of WorldPaper.net, which under efficient implementation of eCommerce can be expected, money invested in owning WorldPaper.com is wasted.

In the short-run the rationale behind mergers is to (1) gain access to markets and distribution networks, (2) reduce costs, and (3) eliminate excess capacities. With respect to market access mergers remove market barriers that are mostly related to information costs of specific markets. Cost reduction arises from (1) decreasing unit costs for overheads and support activities, (2) through integration and automatization of

business process, and (3) through optimization of taxes and government support. Effective management of over-capacities and successful tapping of gains from specialization are the other arguments. However, these arguments can equally apply to a competitively managed industry network model, where economies of scale are larger and industry coordination more effective.

5.3 eEnterprise

In an environment of an accelerated economic metabolism and increasingly global markets traditional- and eBusinesses must keep an eye on competitors that challenge their very existence or might cut vital sources of revenue and profit. The new economic model favors streamlined automated business processes, flatters organizational hierarchies within a networked industry structure of inter-firm collaboration and competition. Thus, pulp and paper producers must invest in linking complex internal processes to the rest of the world. Only by adopting and living the new eBusiness culture that is guided by the principles of openness, connectivity and strategic integration, will firms be able to maintain their competitive edge. It is, however, not only the interface between firms that needs to be redesigned, but all processes that are integrated along the entire value chain.

6. Future Research Activities

This paper is the first in a series of research reports within the Forestry project's study on "New Information Technology and the Forest Sector". Future research will be conducted with respect to a more detailed analysis of the micro-foundation of eCommerce that is discussed in this report. Another issue, which we are currently investigating, is the effect of IT on global paper consumption.

With respect to demand estimations, IIASA is currently developing *Paperscapes*. *Paperscapes* is the world's most detailed digital map of paper consumption levels in real geographic space. The underlying model is '*Demopapgraphics*', which allows the computation of paper consumption as a function of the dynamic demographics of age, education, and gender characteristics of the underlying population.

The final goal is to develop a simple but comprehensive simulation tool, which operates on the level of individual companies and micro-census data for demand estimations. Such a simulation tool should work as an *Escherichi Coli* for a wide spectrum of modelers, who share the interest of improved decision support in a world of high computing power and IT supported knowledge building.

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