Media Foresight for a Multinational Paper Company - From a Paper Producer into a Platform Provider

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1.   Introduction

1.1.   Background

The paper industry has historically been a steadily growing business, where the growth has been proportional to the growth of GDP (Gross Domestic Product). However, the revolution of information and communication technologies (ICT), as well as changing consumption patterns, have decoupled the paper demand from GDP growth. An example of this is the declining demand for newsprint paper in the US from 1987 onwards. Even though the development of ICT has only increased overall paper consumption, continuation of this trend is highly dependent on consumer preferences and development of technology.

Because of the constantly growing demand in the past, R&D investments in the paper industry have been directed to production process development and little attention has been paid to consumer needs. Nowadays a myriad of substitutes for printed media are competing for the consumers' time and the advertisers' money, thus knowing the consumer preferences has become a necessity to the paper companies. In the future an ability to forecast consumer behavior will constitute a significant competitive edge, as key to successful demand forecasts and right strategic decisions.

A revolution, similar to the one the paper industry is facing, has already taken place in many other industries. The food industry, for example, has shifted from foodstuff to convenience food and the wood product industry has encountered increasing competition from synthetic substitutes. In addition to changes in the developed markets of North America and Europe, the developing markets of Asia and South America play an important role in the future, because most of the growth potential comes from these markets. However, the development path of these markets may differ from what we have seen in North America and Europe.

In this project we scan and analyze tools for anticipating consumers' media habits for the foreseeable future from the viewpoint of UPM, the world's 7th biggest paper company. For UPM the development of the media sector is of vital importance, because about 67% (in 2004) of UPM's total turnover (9,820 €m) comes from magazine, newsprint and fine papers. Therefore the possible declining trend in printing paper demand constitutes a serious risk for profitable growth. Due to the dynamics of the paper industry and very long investment pay-back times (10-20 years) traditional approaches, such as strategic market analyses, are not appropriate tools for future forecasts. Instead we apply foresight methodologies and exploit them in strategic planning process.

1.2.   Business Foresight

The aim of this study was to identify foresight methods and tools for anticipating consumer's media behavior and demand for printed paper in the long run. As the digital media has emerged as a remarkable competitor for paper-based media products, the

strategic positioning, and thus also suitable future models of the paper production industry have changed. Traditionally, considering the media and media products, printed paper industries have had a monopoly of materials needed for media products facing the certain needs, and the consumption of the printed paper have strongly correlated with the increasing living standards. Nowadays, we can still assume that the consumption of media products will correlate with the income level, but as regards to printed paper, the question is not as simple. Besides the media products, printed paper producers have to anticipate the relation between media products and printed paper too.

Reflecting this initial position, we define paper industry as an actor providing *platform* for producing *media products*. Digital media can be considered as a suchlike competing platform for producing media products that either provide an equal content or just meet the same needs. Thus, besides the demand for media products, the paper consumption depends on both which products consumers want to use and which platform these products are based on.

In the past paper companies had two major questions concerning the future: *1) How much will consumers use paper in the future* and 2) *What kind of paper consumers use in the future.* Nowadays, the fundamental questions at the bottom are same, but in this work, accepting the breakdown of the monopoly, the questions are addressed both to product level and platform level. As regards to the actual topic, *business foresight in the media sector,* we defined it as methods, tools and processes for anticipating *1) How much will consumers use media products in the future* 2) *What kind of media products will consumers use in the future?* and 3) *What will be the role of printed paper in these products?*

1.3.   Contents of the Study

This paper consists of two parts. Part I consist of three chapters: In chapter 2 we go through some relevant foresight methods and discuss their characteristics in view of several dimensions. In chapter 3, we create a framework for approaching consumer behavior from different perspectives and chapter 4 goes through some earlier studies on the media sector. Part II consists of four independent cases. The aim of the cases is try to illustrate the use of the methods and the framework represented in chapter 3. Leaning on the methodological review and cases, we get three recommendations:

i)   Printed paper consumption should be modeled as a part of the whole media sector, where linkages between paper products and other media products could be perceived.

ii)   Futures modeling and foresight processes should be conducted in collaboration with other stakeholders in the media sector.

iii)   Modeling of the media sector and printed paper consumption should be based on sub-models, where essential characteristics influencing the printed paper consumption could be perceived.

iv)   When using sub-models, processes should be designed to be compatible in order to assess the identified factors and able to scale the impacts of the identified factors in view of the business environment at whole.

PART I: Framework for Media Foresight

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2. Foresight Methods and Tools

2.1. Foresight as Strategy Tool

Foresight can be seen as an instrument for strategic intelligence (Cuhls 2003). From the philosophical point of view, foresight stems from the idea that there is not just one future, but many optional futures and present-day actions can have high impacts on the future that actually reaches the realization (Cuhls 2003). Compared to the traditional forecasting, besides seeing the future, foresight speaks out also dimensions considering nowadays operations and decision making, which are seen as the determining variables when evaluating the future. In the organizational level, the difference between forecasting and foresight can be projected to question of participating. As forecasting tries to give objective estimates on the future, foresight tries to project linkages between optional futures and participants actions and goals. For example in this work, more than estimating the future, the focus is on identifying linkages between futures of media products and printed paper industries.

When exploring typical characteristics of the foresight, two issues come up from the documented studies. First; foresight is *systematic*, which is the quality that distinguishes it from the common future-oriented thinking. Second; foresight requires *co-operation* with other stakeholders which is not actually a defining variable, but moreover a common character.

The goal of foresight, seeing and influencing the future is somewhat obvious, but many times, there is a gap between foresight activities and the actual strategy. Even if the output of the foresight process would be sufficient and understandable, one might find it difficult to get the foresight process along with the decision making. One way to approach this problem is so called *embedded foresight (*Salmenkaita and Salo 2004*)*, where foresight goes along with other organizational activities. In organizational planning, the foresight process should be targeted at different instruments such as strategy planning, R&D portfolios, investment decisions and long-term policy. If the foresight is kept separate from other processes, the activities should be planned so, that the output of the process would be truly useful and compatible with other processes. Of course this requirement will restrict the foresight focus and may leave some important issues outside the consideration, but since the value of the foresight is often multidimensional, the compromises between different dimensions are necessary.

2.2. Some Relevant Foresight Methods

When considering foresight methods, the problem is not the lack of methods, but moreover what methods should be used. The selection of the methods is dependent on the examined issue, but many other restrictions, such as time scale, available information, schedule, resources etc., should also be considered before choosing the methods.

Within the past few years, different projects have produced extensive reports on different foresight methods. For example, within the Millennium project[1] lead by The American Council for the United Nations University a book called *Futures Research Methodology Version 2.0* (Gordon and Glenn 2003) was produced. In the book 25 most essential methods were described in detail. Also other reports, concentrating more on methods for studying technological development, have been published. For example, in the article *Technology futures analysis: Toward integration of the field and new methods*, by Technology Futures Analysis Methods Working Group (TFAMWG 2004), the foresight methods are analyzed in view of futures needs.

When considering the futures research, the notable characteristic is that the professional diversity is very wide. Thus, methods and cases related to the futures research can be found in many different fields of research such as marketing, strategy, operations research, sociology, behavioral scientist, etc. Still, there are many scientific journals that concentrate on methodological development of futures analysis. For example, in the following scientific journals, new methods, tools and also cases are described: *Technological Forecasting and Social Change*[2], *Long Range Planning*[3], *FUTURES*[4], *Journal of Forecasting*[5] and *International Journal of Foresight and Innovation Policy*[6].

Many scientific journals have concentrated more on technological development and their impacts. For example, in the journals *Journal of Technology, Policy and Management*[7], *Technology Analysis & Strategic Management*[8] and *International Journal of Technology Management*[9] futures analysis are considered mostly in view of technological development.

In Finland, the Futures research society is an active community, where one can find a lot of contacts for researchers and industrial actors having interests in futures research. Finland Futures research Centre in Turku is notable actor and also many smaller units, such as Systems Analysis Laboratory in TKK, have carried out studies that are related both futures studies and their own main research interests. Moreover, different industrial interest groups and national research centers such as VATT, ETLA and VTT produce studies related to futures research.

2.2.1. Statistical Models and Trend Analysis

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[1] http://www.acunu.org/
[2] www.elsevier.com/locate/inca/505740
[3] http://www.lrp.ac/
[4] www.elsevier.com/locate/futures
[5] www.elsevier.com/locate/ijforecast
[6] www.inderscience.com/browse/index.php?journalID=78
[7] www.inderscience.com/ijtpm
[8] http://www.tandf.co.uk/journals/titles/09537325.asp
[9] www.inderscience.com/ijtm/

The demand for paper has been traditionally modeled as a linear function of GDP and some other variables. Broadly, statistical models include both descriptive models and structural models.

Descriptive models are used e.g. in studies of market shares or general trends, and are based on e.g. expert interviews or general population surveys. These models try not to make detailed assumptions about the economics that generates the observed outcomes, but present a snapshot of the available information without a clearly defined mathematical model of demand. Using these models in forecasting is difficult, since the underlying mechanisms driving the observed outcomes is not explicitly presented. (Harding 2004)

Structural models are commonly used in empirical econometrics. These models try to describe the effect of a number of variables on demand. Usually, the structural models are formulated as simple linear functions. The models are based on economic theories suggesting that demand is a function of price, income, and other economic variables (rather than behavioral variables). Based on available statistical data, the econometric estimation of the coefficients of interest can be performed by using e.g. Least Squares or Maximum Likelihood methods. After the coefficients of interest have been estimated, the ir magnitude describes the fundamental demand relationship. Under certain restrictions, these coefficients can be interpreted as elasticities, so that it is possible to forecast the impact of changes in them on demand. (Harding 2004)

By far, structural models have been widely used to forecast the demand and consumption of paper. In recent years, the well established link between paper consumption, economic growth and population growth seems to have been broken in some developed countries. This has not, however, happened in China, Russia or the Far East, for example. (Hetemäki 2005) The applicability of current structural models has to be therefore carefully reconsidered, and the models have to be extended to account for e.g. substitution effects of ICT.

2.2.2. Expert opinions and the Delphi method

Delphi can be seen as a first step towards the modern futures research. In the early sixties, the RAND Corporation[10]'s futures studies was dealing with two issues: military potential of future technology and potential political issues and moreover their resolution. The traditional forecast methods, such as role gaming and genius forecasting, were seen as insufficient approaches for dealing with the complex issues and also quantitative approaches were somewhat primitive. (Gordon and Glenn 2003)

Philosophically, the idea behind the Delphi method was that on the average experts, having a lot of knowledge on the issue, make better forecasts than randomly chosen people, and moreover, experts together make better forecasts than single experts. On the other hand, many times, when using expert panels, the discussion does not concern the actual issue, but moreover political or highly topical issues that may have only little to do

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[10] www.rand.com

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with the actual issue. In face-to-face meetings, influential people with good social skills may get excessive attention and even if these kind of persons wouldn't exist, the participants may resort to the phenomena called "groupthink", where the participants support all opinions without proper criticism. Originating these concerns, the researchers at RAND designed a process, where experts could anonymously represent opinions and give feedback on thoughts suggested by other participants.

At least two different groups usually participate in the Delphi process: a *monitor group* and *respondents*. Typically, Delphi processes consist of four rounds: i) First, the monitor group designs the questionnaire and the respondents give their evaluation on the considered issue, for example the GDP of China in 2020. ii) Second, the monitor group compiles the results and distributes them to respondents. Moreover, a new questionnaire is sent to those respondents whose assessments were the extremes. In the questionnaire, they are asked to reassess their opinions in view of the results from the first round. Furthermore, they are asked to justify their divergent opinions. iii) Third, the results from the second round are compiled and sent to the all respondents who are asked to reassess their opinions. Moreover, if possible, they are asked to refute the arguments advocating extreme assessments. iv) At the fourth round, the group consensus is presented, along with the arguments for and against the extreme points.

Usually, Delphi approach is used in three types of questions: i) Forecasts on the occurrence of future developments, ii) desirability of some future state and iii) the means for achieving and avoiding a future state. (Gordon and Glenn 2003).

Plenty of Delphi studies, organized by the public sector, are documented, but in the literature, fewer reports can be found concerning processes organized by the private sector. This does not mean that Delphi studies would not suitable for the business environment but rather public reporting of the studies is more common in the public sector than in the private sector. In the book *The Delphi Method: Techniques and Applications* (Linstone and Turoff 2003) over 50 privately funded Delphi studies are listed and summarized.

The outputs of the Delphi processes can be valuable as such, but in the business environment, the actual value of the processes, and more generally all foresight processes, is that the outputs can be used as an input for other processes. Usually, the results have more than one function. The method is useful for example when defining parameters for market simulations and statistical market forecasts. They can be used as seeds for developing new products and services or trends and signals can be used as a part of justifying new investments. Many times, results are compiled to the official document that can be used as a source book for many organizational activities. Furthermore, a "lessons learned" type of document, where the process is described in detail, is very useful, most notably when designing new foresight activities.

In the late 60's and the early 70's, a lot of Delphi processes were organized both in the public and the private sectors. Nowadays, the Delphi method is not equally popular, but there are many Delphi-based applications that are used in wide range of foresight processes. One application is in-depth interviews, were questionnaires are replaced by

interviews. Another Delphi application is group meetings, where the Delphi process is conducted through online questionnaires and results are compiled by computer. Many times the Delphi process is used as a part of the foresight process, for example for collecting background material for workshops. Moreover, depending on the participants, the Delphi process can have many functions. For example, by taking consumers and marketing people along, the actual process is not just collecting expert opinions but moreover organizing dialogue between the different levels of the innovation system.

When considering the usage of the Delphi method, the first question is that is there easier and more reliable method to do that. For example, if we can answer the question by using time-series, it is not useful to use Delphi. A Delphi process is a good method for studying issues where numerical data-based analysis does not give appropriate estimates on the considered issue. For example, the issue might be too complex to handle with numerical models or there might be no data available. Furthermore, many times, especially before and during the technological breakthroughs, it is well-grounded to assume that future cannot be estimated from the nowadays time series, even if the time series have given good estimates earlier. Overall, the usage of the Delphi is well-grounded only, when time-series are not appropriate.

The well-grounded usage of the method has other restrictions too. When designing the method, the questions have to be defined beforehand and we have to have even some hint of the issue before the process. Thus, many times the method is not suitable for scanning entirely new signals and trends but moreover considering strengths, opportunities, consequences and possible realizations of the beforehand defined trends and signals. The iterative and consensus targeted approach is useful, if we want to have well-grounded estimates on the considered issue, but when fostering the diversity of the future views, other methods such as scenario based expert views are nowadays seen as more suitable approaches.

2.2.3. Scenarios

Scenarios originate in Rand Corporation and political and military strategies. Actually, term "scenario" was used already in the 50's, before Delphi method, but in the 60's and the early 70's, most of the influential foresight processes were organized through Delphi applications. The actual value of scenarios and more generally, value of many alternative futures, came to light during the Oil Crisis in 1973, when Shell International Petroleum Company used scenarios for anticipating the rise and fall of oil prices. During the stunning crisis, the Delphi method and consensus was no longer valid method for anticipating the future and creating many futures was seen more suitable way of modeling turbulent environment. Nowadays, scenarios are used in wide range of applications both in public and private sector. (Gordon and Glenn 2003)

Scenario is a story that connects a specific future state to the present reality, describes essential variables, causal links and illustrates the consequences of the decisions. When describing scenarios, a certain focus should be chosen i.e. country, industry, organization etc. and also the time scale should be fixed.

The idea of using scenarios is not to try to find the most likely image of the future, but create sets of scenarios that represent alternative future paths and images. A single scenario, or divergence towards the "most likely" scenario is rarely a useful way to use scenarios. Nowadays, many futurists and planners see that no single, but moreover sets of scenarios should be used in planning. Actually, if we interpret a scenario in detail, no scenario is even probable. The value of the scenarios is the ability to help decision makers in making well recommended and justified decisions. According to Glenn (Gordon and Glenn 2003), "Good" scenarios are those that are 1) Plausible (a rational route from here to there that make causal processes and decisions explicit), 2) Internally consistent (alternative scenarios should address similar issues so that they can be compared) and 3) Sufficiently interesting and exciting to make the future "real" enough to influence decision making. (Gordon and Glenn 2003)

Generally, we have roughly two kinds of scenarios. Some scenarios describe only a snapshot of the future and some scenarios create also history for the snapshot. Generally, the latter mentioned is used whole more often and in many cases only they are perceived as scenarios. This partition is essential, if we apply the partition to the initial state of the scenario. Explorative and descriptive scenarios start from the present and inductively necessitate future conditions from nowadays i.e. they use future history as a starting point. Normative scenarios describe how desirable future state can be achieved and thus create future history based on a snapshot of the future.

There are numerous methods for creating scenarios. In this work, we do not get through all of them, but moreover discuss some typical characteristics. One way to create scenarios is first create large set of scenarios and iteratively synthesize them ending up to smaller set of scenarios (For example Coates and Jarret CO). Some techniques emphasize driving forces and uncertainties as a basis of scenarios (Schwartz 1991) and some techniques start from the question of what the managers want to know. Also morphological and structural analysis (Godet 1993) and division between external and internal factors are seen as a useful basis of the scenario building.

Scenarios are used for systematic exploring of both desirable and undesirable futures conditions. The goal of scenarios is understanding, and with scenarios decision makers can link futures conditions to nowadays environment and identify potentially critical factors (i.e. trends, events etc. affecting future conditions). Scenarios can be used in generating long-term policies, strategies and plans. For example, scenarios can be a source of information when designing R&D portfolios or creating long-term forecasts.

The most commonly admitted strengths and weaknesses of the scenario-based working are related to the same characteristics. The biggest strength of the scenarios is that they can compile and synthesize complex information on the future to the understandable and influential form. On the other hand, people tend to perceive understandable information more as a truth than alternative and most likely improbable future paths. Thus, many times single scenarios and mental models originating from these trains of thoughts have more influence on the decision making than they actually have prerequisites. Another criticism, which is targeted many times on the scenario-based working, is the unnecessary formal and scientific approach, which influences also the misjudgment of the truth-value

of scenarios; however, scenarios are only well-formed opinions, and their function is to act only as tentative background.

2.2.4.   Workshops

Workshops are one of the essential forms of foresight work. Within the past years, almost all publicly-funded Finnish foresight activities have involved workshops (For example FinnSight 2015[11], National foresight network[12]), where experts from different sectors can freely interact and discuss the future development. Also in the private sector, future-oriented workshop are seen as an efficient instrument in different parts of the strategy process, but compared to the public funded activities, the participants may consist more of their own employees and consultants and thus the diverse of different viewpoint may stay more restricted. Moreover, the results and the practices aren't reported in the same scale that in public sector.

The basic idea of the workshops is that around 6 to 15 participants get together to discuss a defined issue. The issue may be strictly defined such as the future of hydrogen vehicles or discussion can also be controlled by methods such as brainstorming or dialogue. A workshop can be considered as an independent event, but for a methodological review, we approach the workshop methodology from two different angles: On one hand, workshops are part of a bigger process and on the other hand, workshops consist of different processes.

If we review workshops as a sub-process, they can be seen either as an opening (i.e. goal of the workshop is to initialize future work) or as a cumulative (i.e. goal of the process is synthesize pre-collected information) process. Compared to other foresight methods, the main advantage of the workshops is interaction and creativity. On the other hand, to reach these advantages, the number of participants must be limited and thus the scope of different perspectives stays restricted. Moreover, the workshop participants may resort to a phenomenon called 'groupthink', where participants systematically make misjudgments on the issue on the table.

If we consider a workshop as a meeting where we want to generate new ideas, we should use methods that are designed for this certain purpose. Brainstorming is one of the most popular methods used in this kind of purpose. In the brainstorming session, a group of participants generate new ideas, and criticism is not allowed. The facilitator may enrich the discussion and a secretary writes down the ideas. Brainstorming can be seen as an application of dialogue technique,(For example Slotte 2005) where pre-defined rules are used for channeling the discussion. The rules can be defined case-specifically, but often certain virtues such as listening and respect are included in the rules. Many times, the subject of the discussion is pre-defined (Socrates' dialogue, for example), but often dialogue sessions are organized using an open dialogue, where the actual subject is assumed to shape up through the discussion and only rules and virtues are used for controlling the discussion.

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[11] www.finnsight2015.fi
[12] http://www.sitra.fi/fi/Ohjelmat/innovaatiot/innovaatiot_ennakointi/ennakointi.htm

Compared to brainstorming, the dialogue method emphasizes interaction between participants and the content of the discussion is less restricted. Obviously, this has many advantages, but if we want to take results of the workshop for further analysis, the results of the dialogue session is sometimes hard to document and carry on to the next steps on the process. Thus, if we want to deepen the participants understanding on the considered subject, the dialogue is a suitable method, but if we just want to have material for upcoming steps of the process, we should use methods, where we can document the results for further elaboration.

If the topic of the workshop is to synthesize the results, the background material acts a major role. For example, results of the Delphi method or scenarios can be used as a basis of the workshop. In the article "*Diversity in Foresight: Insights from the Fostering of Innovation Ideas*" (Könnölä *et al.* 2006), a method is described, where innovation ideas are evaluated and solicited through Internet, and after that the ideas are analyzed and brought to the workshop. In the study, workshops are seen as a synthesizing part of the process and all the earlier phases (i.e. generation, evaluation and analysis of innovation ideas) are designed to support the workshop discussion.

Workshops can be supported with different methods. Traditional and the most commonly used method is voting where participants can give their opinion on the considered issue and the results are synthesized by analyzing the votes. Another approach for promoting workshop discussion is to use decision support tools for structuring the discussion (Salo and Liesiö 2006, Salo and Gustafsson 2004), where the tools are used for structuring the workshop discussion. Voting and decision support tools alike can be used both for structuring pre-collected material and opinions represented in the workshop.

Even if we have described workshops as either opening or cumulative, the division is somewhat artificial. In practice, most of the workshops include both elements. For example Könnölä et. al. (2006), use pre-questionnaires and decision support methods for identifying many kinds of opportunities more than getting one consensus. Dialogue methods can be used synthesizing the pre-collected information and in many cases workshops consists of both idea generation and analysis. Considering the foresight process in whole, workshops should be planned so that, i) they answer on the defined purpose, ii) important results from former tasks can be exploited and iii) the results of the workshops are useful and understandable for further use.

2.2.5. Screening of patent databases and publications

Patent databases and scientific publications are a natural source for information about emerging technologies. Often, the amount of data available from these sources is overwhelming, requiring systematic analysis and approaches to produce usable guidance for managers. An approach known as text mining (Teichert & Mittermeyer 2002) or tech mining (Porter 2005) uses specific software tools to exploit science and technology information resources. Porter (2005) draws a distinction between tech mining and data mining, tech mining starting with technology manager needs rather than with the data.

The tech mining process contains three key elements: Data, Software, and Technology Intelligence Products (TIPs), and involves people in many different types of roles, as illustrated in Figure 1.
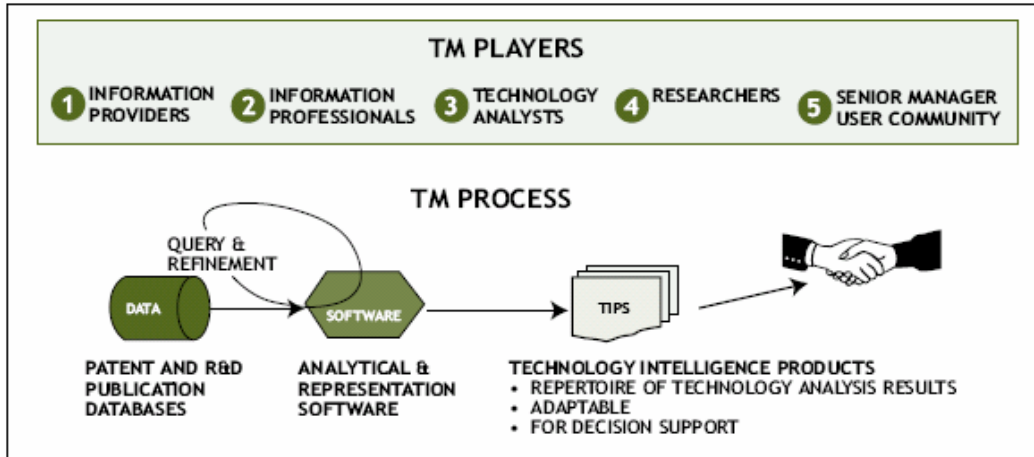

Figure 1: Tech mining process and players (Source: Porter 2005)

The analyzed data is gathered mainly from R&D publication databases and patent abstract databases. These can be complemented by other data from e.g. research funding and projects, company internal resources, press resources, and Internet searches. A central role in the process is taken by the software tools. Without them the analysis of thousands of records would be impractical and cumbersome. The software tools are used to search and retrieve, clean and analyze, as well as represent and visualize the data. The tools can be used to automate these actions, speeding up the process in consecutive runs. As the output from the tools, different types of technology intelligence products are generated to aid managers in their decision making.

The outcomes from the tech mining process (i.e. the TIPs) can answer many different types of questions. The maturity and commercialization phase of the technology in question can be evaluated by analyzing e.g. the trends and growth in the number of publications and the backgrounds of the publication authors (academy / business / government). Clustering the topics and authors can be used to visualize the networks and links active in the area, and to answer "who's who in this business" type of questions.

2.2.6. Diffusion models and simulations

As print media is facing the threat of new technologies possibly substituting its position as consumers' media platform, it is important to be able to predict the pace by which these new innovations penetrate to the markets. For this purpose, the family of diffusion models can be utilized.

By diffusion, we mean the process by which an innovation, e.g. a new product or idea, is accepted by the market. Diffusion models are based on the *diffusion of innovations theory*

originally formalized by Rogers in 1962. Rogers (1995) defines the diffusion of innovations as the process by which they are communicated through certain channels over time among the members of a social system. Thus, the key elements of the diffusion process are innovation, communication channels, time, and the social system. (Mahajan et al. 1990)

Rogers categorizes the adopters of any new innovation or idea to innovators, early adopters, early majority, late majority, and laggards, as illustrated by the bell curve in Figure 2.
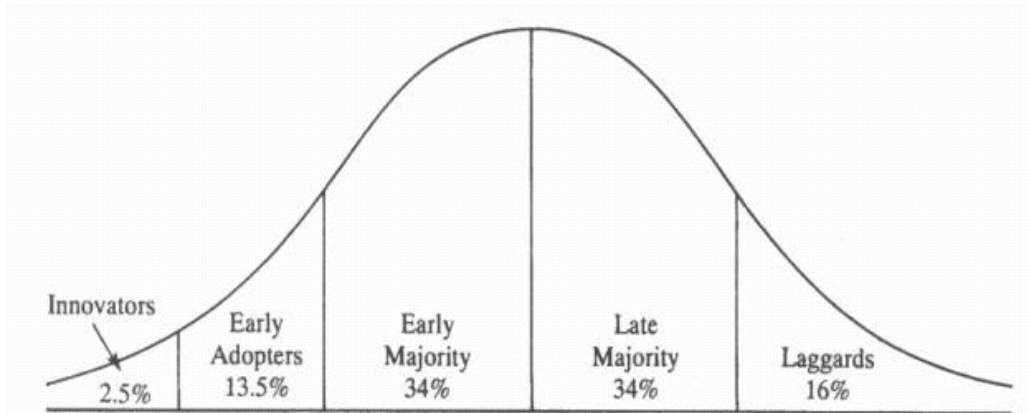
Figure 2: Adopter categorization on the basis of innovativeness (Rogers, 1995)

Another way to illustrate this same market behavior is in the form of an S-shaped curve, i.e. a curve showing the cumulative number of users as a function of time. The shape of the S-curve can be forecasted using e.g. the Bass model.

The Bass model (1969) assumes that the adopters of an innovation are influenced by both external and internal means of communication, i.e. mass media and word-of-mouth. A group of adopters called "Innovators" adopt exclusively because of mass media communication, whereas the "Imitators" are influenced only by word-of-mouth. This is illustrated in Figure 3.
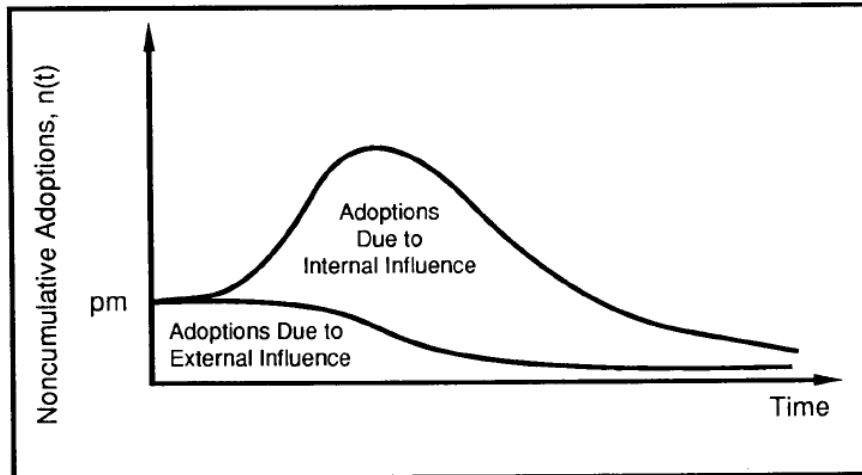
Figure 3: Adoptions due to external and internal influences in the Bass model

The Bass model (and its extensions, see e.g. Mahajan et al. 1990) can be used to forecast adoption of brand new innovations, whereas the model proposed by Fisher & Pry (1971) is suited for forecasting the replacement of an old product by a new, technologically superior product.

After a suitable model has been chosen, data should be gathered from the early stages of adoption. Curve-fitting techniques are then used to estimate the model parameters, and to forecast the future adoption rate. Examples of S-curves for both first-time adoption and replacement cases for a number of products and services are shown in Figure 4:
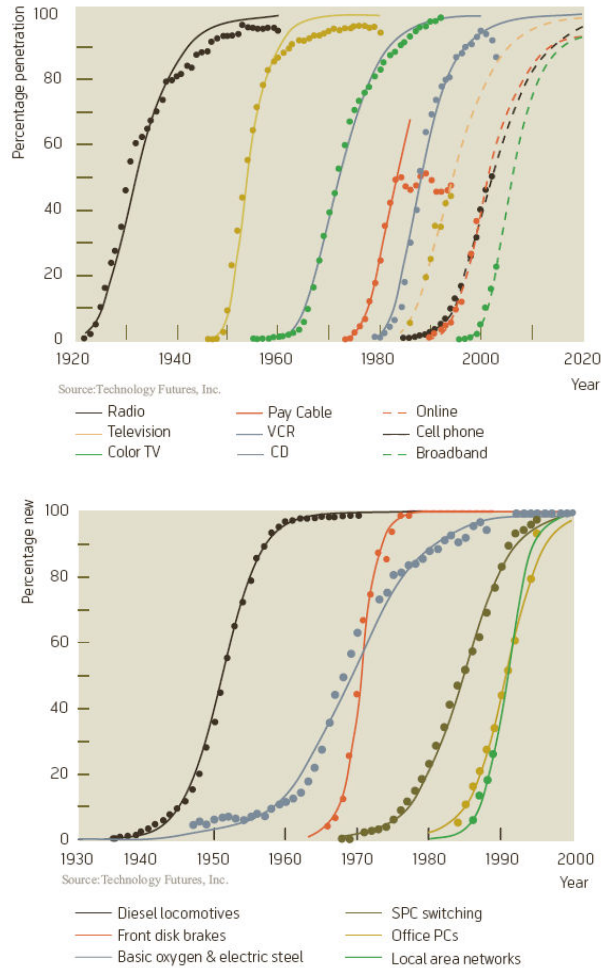
Figure 4: S-curves for first-time adoption (left) and technology substitution (right).

Source: Vanston & Hodges 2004

In the case of emerging technologies, reliable prior data might not be always available. In these cases, parameter estimates can be obtained by finding product/service analogies from the market, and using their diffusion histories as basis for the forecasts.

Diffusion models such as the Bass model and Fisher-Pry model forecast the aggregate diffusion or adoption of a technology or service in a certain market, industry, or other community. Another group of models focuses on the micro-level behavior of an individual adopter. Examples of these include e.g. the Technology Acceptance Model presented by Davis (1986, 1989) and the Theory of Planned Behavior (Ajzen 1988).

2.2.7. Idea solicitation and innovation stores

Many contemporary organizations approach questions about the future by creating sets of ideas having potential interest in the future. For example, several global companies and research institutes maintain a database where employees can freely submit and evaluate

ideas and signals concerning the future of the organization. Also ministries and societally oriented institutes use idea sets as a basis for cross-societal networks and forums. Often there exists no distinct database but the ideas are solicited only for one certain purpose such as creating a research agenda or defining a strategy.

The rationale behind idea solicitation and innovation stores is that set of selected participants propose and evaluate ideas, after which decision makers chooses the most interesting issues for further consideration. This kind of approach can be used for example when designing a strategy, a research agenda or a long-term policy, or exploring new future opportunities.

There are some characteristics that must be defined before starting. The first question is that are the ideas solicited for one particular purpose only, or is the target to maintain a long-term database. In the former case the process can be designed to respond to the particular goals and thus the ideas are considered as instruments for the process. On the other hand, if we collect ideas with a wider focus, we can use them in many processes and moreover there is a somewhat higher chance to catch also *weak signals* (Ansoff 1975), that may stay out of the discussion, if the focus is too narrow.

Another characteristic is the delineation of signals, which is somewhat related to the duration of the process. If the focus is clear and the time horizon limited, we are able to delineate the signals more exactly. For example, if the target of the process is to define the focal areas of the R&D portfolios with a five year focus, we can solicit ideas and signals that are strongly related to research projects and thus it is easy to use these ideas in the actual decision making. On the other hand, if we just want to get constantly new innovative ideas and opinions from the employees and stakeholders for generic purposes, the solicited elements must be more loosely delineated.

When creating and evaluating sets of ideas, one important issue is the configuration of participants, who propose and evaluate ideas. The first question is that are the participants anonymous. If they are, it is easier to elicit divergent ideas, but on the other hand, often it is essential that one can trace the origin of an idea. The simplest model of a solicitation process is that every participant can propose and evaluate as many ideas as they want. On the other hand, if we make initial assumptions such as researchers have a better understanding on novelty and some others have a better understanding on marketing potential, it is well-grounded to divide tasks so that every participant can contribute to the process by exploiting his or her own special expertise. But again, on the other hand, when seeking new opportunities it may be useful, that the participants do not restrict only on their own core know-how, but instead try to seek new opportunities from other perspectives too.

When creating large sets of ideas, an important question is that how the ideas are organized and how the decision maker can choose the most promising ideas into the discussion. A basic idea is that the participants evaluate the ideas, and the ideas having the strongest support are highlighted. However, ideas can be interesting from diverse perspectives. Some ideas may be novel, and some influential. Some ideas are interesting from marketing perspective and some ideas may get support only from researchers. One

way to approach this problem is to evaluate ideas as regards different criteria and use different decision support tools and decision rules to organize ideas. For example in the paper (Könnölä et. al. 2006) the ideas are organized by using portfolio-optimization (Liesiö et. al. 2006).

The solicitation of ideas has proved to be a useful way of foresight. Overall, it is an efficient and somewhat creative method of discussing the future, but when using the method, some notes should be taken into account. First, the method is not very sufficient as such and for getting proper knowledge, other methods should be used alongside. For example idea solicitation combined with workshops is found useful (Könnölä et. al. 2006). Another consideration is that by delineating the solicited unit, many relevant issues may stay out of the discussion. Also overlapping and coupling between ideas may call for further analysis.

2.3. *Classification of Methods*

When classifying methods, the question on the background is: for which purpose the method is used. For example, if we are doing long-range planning, the suitable methods differ from the methods that are used for estimating the next quartile sales. Also, if we want to identify breakthrough innovations, we should use different methods than when modeling established markets.

Here, we define five dimensions for outlining the above-listed methods. The division is not complementary, i.e. sometimes a method can have both characteristics.

- *Long-term – short-term*

- *Continuous – discontinuous*

- *Qualitative - quantitative*

- *Action oriented – Explorative*

- *Bottom-up – top-down*

The first two dimensions describe the character of the contemplated environment. Time scale can be *short-term* or *long-term* (or mid-term) and by choosing the time-scale, we restrict the suitable set of methods. On the other hand, we can model the established environment, where the future is assumed to be extrapolated from the present (*continuous*), or we can try to explore the *discontinuities* in the business environment and try to identify the factors and their consequences on the considered environment.

The last three dimensions define the characteristics of the method. The results of the process carried out by chosen method can be either *qualitative* or *quantitative*. If we want to influence on the future, we should use *action oriented* methods and if the target of the process is just collecting information and enhancing understanding, we should choose *explorative methods*. Processes carried out by *bottom-up* methods identify factors and

phenomena in the micro level and make conclusions in the macro-level. If we want to consider how macro-scale phenomena influence in the micro-level, we should use *top-down* methods.

In the Table 1, the former described methods are classified in view of these five dimensions

Table 1 Method classification

	Short term	Long term	Continuous	Discontinuous	Qualitative	Quantitative	Explorative	Action oriented	Bottom-up	Top-Down
Statistical models and trend analysis	x		x			x	x			x
Expert opinions and Delphi method		x	x	(x)	x		x		x	
Scenarios		x	x	x	x		x	(x)	x	x
Workshops	x	x	x	x	x		x	x	x	x
Tech mining		x	x	(x)	x		x		x	
Diffusion models	x	(x)	x	x		x	x		x	
Idea solicitation and innovation stores		x	x	x	x		x	x	x	

If we want to make short-term forecasts (i.e. with a time scale of couple years), many qualitative methods are suitable, assuming that there is enough data available. For example statistical models and diffusion models are suitable for short-term forecasts. Statistical models are suitable, when the business environment is somewhat established, but if it is plausible to expect major technological changes in the future, diffusion models may be more useful.

In the longer term, the complexity of the considered environment increases and these two methods may turn out to be insufficient. Of course, especially diffusion models can be used for modeling the environment also in the log run, but as the model parameters cannot be estimated strictly, the gain of the model is to understand, not to predict the most probable future state. In the log run, we can try to anticipate both continuous and discontinuous changes. Actually, all the long-term methods are suitable for anticipating continuous changes, but some are not suitable for anticipating discontinuous.

Tech mining is an explorative bottom up method, where documented information is used as main source of information. Thus, it mainly suits for anticipating continuous changes, but if we define discontinuous as a subjective phenomenon, we can found historical changes that might cause discontinuous changes in our own business environment.

Delphi is an explorative bottom-up method handling participants' consensus as a most probable state of the future and thus it suits mainly for anticipating continuous changes. On the other hand, divergent opinions may give hints of discontinuities and moreover, the questions can be designed so that the process concentrates mainly on discontinuities. Still in this case, we must have some information on discontinuity so that we can assess the questions sufficiently.

Scenarios can be used for anticipating long-term discontinuous changes. Depending on the methods used for building scenarios, they can be either bottom-up or top-down processes. The purpose of the scenarios is mainly to understand the future, and thus it can be seen as an explorative method. On the other hand, when scenarios are taken into a strategy work, they can be seen as a part of action oriented work.

Workshops can include all the earlier mentioned dimensions. If pre-collected material is for example project proposals and the goal is to define strategy, the workshop is a bottom-up process. If we want to choose future projects based on earlier defined strategy, workshop is a top-down process. If the target of the workshop is to make decisions, the method is action oriented, but if we just want to network and discuss the future, the character of the workshop is explorative.

Idea solicitation is primarily action oriented method, but the ideas can be used also for exploring opportunities. If we want to explore and synthetisize ideas, the method proceeds from micro-level to macro-level. On the other hand, if the target of the process is to choose some of the ideas for further discussion, the method may be seen as a top-down method.

2.4.   Conclusions

The selection of the method depends highly on the considered environment and if we do not have a target, we can't define the suitable methods. Chapter 3 presents a framework, which may help to characterize the target.

After we have chosen the issue, we have to decide the time-scale and the environment. For example, in short time scale and stable environment, we can use statistical methods and in long-term foresight and turbulent environment we could use for example scenarios.

After defining the considered issue and the environment, the next question is that what information we have and what kind of information we want as a result of the process. In an established environment, if we have a lot of numerical data available, we could use statistical models. If there is no data available, for example the Delphi method could be suitable for the purpose. If we want to explore potential innovations in the future, we could use tech mining, but if the target is to define future innovations for developing, solicitation of ideas might be well grounded approach. Finally, we have to consider also our own resources i.e. available time, budget, know-how etc.

Overall, the selection of the suitable method depends on the considered issue, time-scale, environment, available data, purpose of use, and own resources. So, when designing foresight activities, all these dimensions should be taken into account. Many times a process carried out by just one method is not reliable and extensive enough and we have to use many methods in parallel. Then, we should design these sub-processes so that besides being sufficient in view of these dimensions, they should also be compatible together.

3. Factors Affecting Consumer Media Usage

In this chapter we develop a framework for identifying factors affecting consumer media behavior, i.e. factors influencing the decisions of consumers to use media products. The purpose of the framework is to consider influential factors from both macro and micro level perspectives. At the micro-level, we define three dimensions; two related to the consumer and one related to the products. In the macro-level, we define dimensions for both market and policy perspectives.

For consumers, we define two dimensions; *consumer characteristics,* such as age, geography, sex, income and factors defining different *consumer needs* such as functions of use, time of use, etc. For products, we define factors related to the *product characteristics* such as price, usability, availability, etc. Considering the business environment, we define factors related to the *market and industry structures* such as publishers, advertising and factors related to the *policy* making such as education, environment and taxes. The framework is illustrated in the Figure 5.
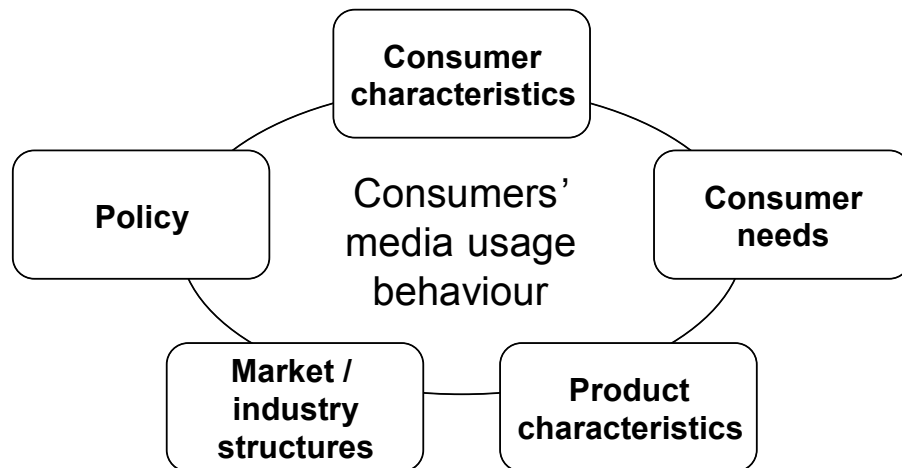
Figure 5: Factors affecting consumers' media usage behaviour

3.1. Consumer Characteristics

For consumer behaviour studies, the population of a certain market or market segment can be characterized by a number of demographic, psychographic, and behavioural variables. Demographic variables include e.g. age, sex, religion, education, literacy, socio-economic status, income, family size etc. Psychographic variables are related to the personality, attitudes, interests, and lifestyles of the consumers, and as such are more difficult to measure than the demographic variables. Behavioural variables, on the other hand, are related e.g. to the usage of time or certain products.

When studying changes in the media usage behaviour, it is important to select the right variables to be followed. The variables should be measurable, and their effects on the

media consumption decisions understood. Examples of important variables having an effect on consumer media usage are shown in Table 2.

Table 2: Characteristics of consumers having an effect on their media usage behaviour

Demographic variables	Psychographic variables	Behavioural variables
• Age distribution • Education level • Literacy level, also computer and media literacy • Expendable income • Ownership of television, personal computer, internet/broadband connection, mobile phones (basic/advanced)	• Attitudes: Towards nature and environment, e.g. strength of the environmental movement • Lifestyles: Technologically oriented vs. conservative, globally vs. locally oriented	• Time spent at home, in the office, on the move • Breakdown of time when reachable by different medias: TV, radio, newspapers, Internet

Based on the variables, it is also possible to divide a certain market to smaller segments. Each segment can then be analyzed independently, and changes in the size of the segments predicted. It is also important to recognize trends and discontinuities in the identified variables, and to understand the cause-effect relationships behind them. Forecasts for the future development of the key variables can then be utilized when constructing a higher-level forecast for the aggregate media usage.

Statistics and data about media usage of consumers are usually broken down according to at least one variable, the age (see e.g. Media Literacy Clearinghouse 2006). It is more difficult to find studies and data on e.g. the effect of psychographic variables on media usage. A good point of departure for finding this data could be the advertisers and consultants / market research groups serving them. In the U.S., for example, the Simmons Market Research Bureau (2006) does extensive measurements on a large number of U.S. consumers, linking their demographic and psychographic properties to the usage of variety of products, including media products. This data is, however, supposedly easier to find from the developed markets than from the developing countries.

3.2. Consumer Needs

In addition to the communication method itself also the media content has much influence to consumers' behavior. This aspect is important because paper based commutation is well suited for some types of information while in some applications the benefits of digital technologies are incontestable.

The factors affecting media consumption can be divided in many different ways, but some commonly used determinants are price, social and behavioral, content specific, ease of use, and technology related factors. The content specific factors include for example type of information and media interactivity. The type of information means in this context both the information content and the lead time in communication. The basic information types can be described for example as:

- Real time information: stock quotes, exchange rates, important news

- Catalogue and register information: telephone directory, time tables

- Transferring of the comprehension: books, novels, magazines

- Entertainment and time consumption: magazines, comics

A slightly different approach to the division of information types is proposed by Abelström (1999). The division emphasizes the information needs of consumers and it is founded on Maslow's hierarchy of needs. The basic information needs can be linked to Maslow's hierarchy of needs as follows: *Emotional needs* consist of our need to relax, be entertained and maintain social relationships. *Functional needs* present our daily demand for information in certain topics, whereas *influence needs* stand for the need of different organizations and individuals to infuence their stakeholders.

Furthermore, Abelström suggests that information can be characterized by two main concepts: push or pull orientation and topicality or durability. Understanding the effect of information types and their role in consumer behavior is very important for being able to assess the strengths of different media platforms.

3.3.   Product Characteristics

Product characteristics are a direct counterpart for consumer needs; the media behavior of consumers is dependent on how well the media products match the needs of prospective users. Different types of information and means of communication are needed for satisfying the consumer needs described earlier.

Topical information is generally very portable because content itself is in the focus. On the other hand, paper is well suited for durable information. Internet is mainly used for pull-type information, whereas traditional media deliver mainly push-type information. In Figure 6 some information types are plotted on the push-pull and topical-durable dimensions. It is noteworthy to recognize that advertising is mainly push-oriented, and as such not so well suited for Internet. For example, at the moment there is no digital alternative for catalogs and leaflets that are distributed with newspapers.
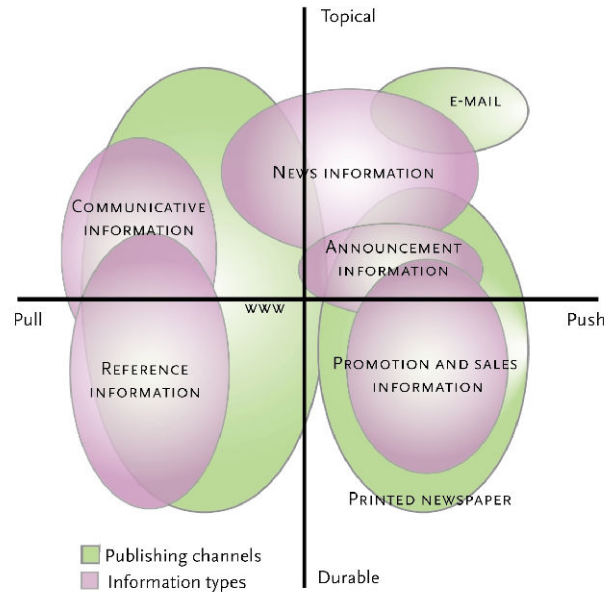
Figure 6 Classification of some information types with the discussed dimensions

(Abelström 2005)

However, the push/pull division is not sufficient in answering the question why most people still prefer to read old news from a newspaper instead of following real time news from Internet based services. Possible explanations could include e.g. old habits, bigger "screen size", or higher flexibility regarding location of use. A more holistic approach for this problem is presented in Chapter 7, where a process to evaluate media products in terms of different properties and consumer preferences is described.

3.4. Market Structures

Media industries, including e.g. television, magazines, and newspapers, are operating in so-called *two-sided markets*. In effect, this means that the companies operating in these industries get a part of their revenues by selling interesting content to consumers, and another part by selling advertising space in their respective media to other companies. The dynamics of this type of industries are interesting, as the value of a certain medium to both sides of the market depends on the other side. Advertisers value a medium more if it reaches more consumers, whereas consumers are likely to value a medium less as the number of advertisements increases.

When studying consumer media usage, it is important to understand these dynamics, as well as the role of other players in the value network. In different markets, the relative position and bargaining power of different players may differ, having an effect e.g. on the importance of advertising revenues to the newspaper business. Media consolidation and the role of media conglomerates may also have an effect on the choices between electronic and traditional media (see e.g. Compaine & Gomery 2000).

National policies and regulations are in a key role in defining the market structure. These are discussed further in the next sub-section.

3.5. Policy Factors

Governmental activities can have quite an impact on paper consumption, especially in developing countries. At the same time, global environmental issues are getting more and more attention, and the growing paper consumption is often considered as a threat to sustainable development. Also, the digital media breakthrough in education provides significant threats and opportunities to future paper use (see also 6.4.). These are just few examples of policy-related events that may affect paper consumption. Many of these impacts are indirect, meaning that they actually affect product/consumer characteristics or consumer needs and through them paper consuming.

The governmental power is especially high in China, which has for example very tight press regulation (www.cpj.org) and tight policy towards foreign investments (Jussila 2005), surely having an impact on paper consumption. A study of digital mobile technology diffusion in the developing countries by (Rouvinen 2004) defines some governmental based socio-economic variables, which are also applicable to paper media usage. Factors increasing the mobile penetration include e.g. political freedom, amount of trade, and degree of industrialization. Additional factors to follow could include e.g. participation in international organizations (such as WTO), literacy rates (controllable by educational politics), freedom of speech, and censoring of certain media.

Also in the Western world, the governments can affect the paper consumption. For example taxation emphasis (on environmental basis) could affect the paper product prices or supporting of the digital media generalization might diminish the printed media demand. The latter can present threats especially in the long run, if the educational use of digital media is strongly supported. This could lead to a world, where the consumers would grow up without being used to using paper products, which would definitely mean diminishing paper demand.

Although the interpretation of above mentioned factors can be complicated, even more problematic is the risk analysis of political events. In comparison to for example economical development, there are no reliable models that produce probabilities to political events. Therefore, when evaluating the significance of a single factor, soft methods such as Delphi or usage of political scenarios are the most usable ones.

3.6. Conclusions

In this chapter, we have briefly described five different groups of factors affecting consumers' media behavior. Evidently, the mechanisms and factors defining paper demand are very complex. The simple beauty of linear models using GDP and population growth as inputs is quickly lost when one tries to craft models based on the identified

factors. Care should be taken when balancing between model complexity and the quality of results.

Because of the inherent complexity, we strongly encourage building many sub-models, where futures of media sector and paper consumption could be considered along the different dimensions. Managerial decisions should then be based on the results from several models and processes. Following this approach, we are not aiming towards a single unified model in this study, but look for the most interesting areas where foresight methods and processes could add value to decision-making.

4. Some Existing Research on Paper Consumption

A vast majority of research papers on newsprint paper and printing & writing paper demand are either multi-client studies conducted by private consultancies (Jaakko Pöyry[13], URS Forestry, to name a few) not available in public or clandestine outcomes of long-term market research in private companies. However, there are also public actors, such as FAO of UN, several non-profit corporations, forestry unions, newspaper unions and postal unions, which have published researches on issues related to paper demand. Studies addressing market diffusion of novel communications, broadcast and display technologies are relevant in understanding in media substitution, since academic research on the impact of IT on paper demand is almost non-existent (Hetemäki & Nilsson, 2005). It is notable, that the variations between the outcomes and demand projections of different studies are significant.

Some of these studies employ proprietary models (e.g. He & Barr 2004) leaving the methodological issues concealed. Many of the public projections employ simple econometric models (Hetemäki & Obersteiner 2001) unable to cover issues such as substitutive technologies. Consultancies have provided some information about their working methods into public. For example Jaakko Pöyry's JP Viewpoint (Leskijärvi et al. 2005) is an iterative process where scenarios are elaborated jointly with clients to complement the consultancy's baseline projection.

Organizations addressing media use and new media consist mainly of private consultancies, national and international newspaper unions, research organizations and postal unions. To name a few, new media is addressed by a small concultancy Media Foresight Associates[14], The Institute for Cyberinformation[15], Forrester Research[16], Alpha to Omega[17] and The Electronic Document Systems Foundation (EDSF)[18]. Universal Postal Union[19] has been especially comprehensive in conducting research on impact of

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[13] Jaakko Pöyry: World Paper Market up to 2020:
http://forestindustry.poyry.com/linked/en/news/WorldPaperMarkets2020brochureandorderform.pdf
[14] Media Foresight Associates: http://www.mediaforesight.org/
[15] The Institute for CyberInformation: http://www.ici.kent.edu/
[16] Forrester Research: http://www.forrester.com/
[17] Alpha to Omega: http://www.alpha2omega.co.uk/
[18] EDSF: http://www.edsf.org/
[19] UPU: http://www.upu.int/

different factors on communications media, such as impact of age, gender and life stage (Szeto 2005), impact of preferences (Szeto & Jimenez 2005), substitution patterns (Nader & Jimenez 2005) and electronic marketing (Diakova 2005).

Paper demand scenarios and projection are mostly constructed by forestry unions, forestry consultancies such as Jaakko Pöyry, Pira[20], URS, The Boston Consulting Group[21] and ÅF-CTS Oy[22] and national or international research institutes such as The International Institute for Applied Systems Analysis (IIASA)[23], The International Union of Forest Research Organizations (IUFRO)[24], The Canadian Forest Service[25], FAO and Forest Trends –program[26].

Papers written in English often address West-Europe and U.S, and research done on paper demand in the developing countries gain overly little attention as regards to their market potential.

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[20] Pira: http://www.piranet.com/
[21] BCG: http://www.bcg.com
[22] ÅF-CTS Oy: http://www.ctse.fi/
[23] IIASA: http://www/iiasa.ac.at/
[24] IUFRO: http://www.iufro.org/
[25] The Canadian Forest Service: http://www.nrcan-rncan.gc.ca/cfs/
[26] Forest Trends: http://www.forest-trends.org/

4.1. Long-term Market Scenarios as a Basis for Short-term Actions

In her master's thesis H. Lehtinen constructs a literature-based description of paper product demand estimation process and compares it to the current practices of a Finnish forest industry company (Lehtinen, 2006). Though the time horizon of demand scenarios in the study was significantly shorter, overall paper market was addressed instead of user media consumption and no substance matter was provided whatsoever, the provided framework remains worthwhile when a bigger picture of the process is needed. As Figure 7 depicts, long-term market demand scenarios and forecasts serve as a basis for company's short-term actions.
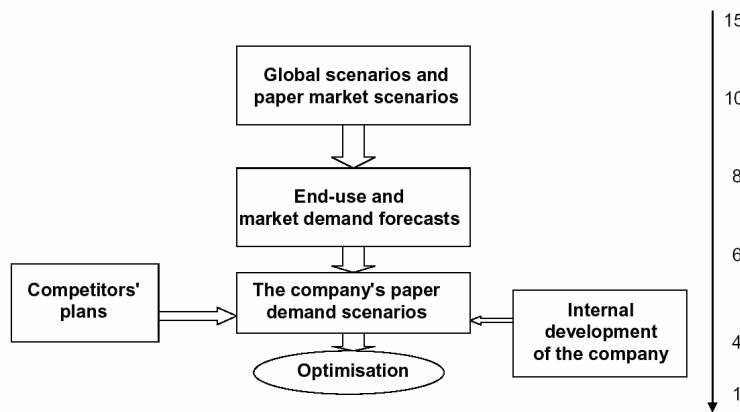

Figure 8 - Time span of a literature-based paper product demand estimation process (Lehtinen, 2006).

In Figure 9 environment observation, global scenario building and market scenario building are fitted into a bigger picture describing the whole demand estimation process. Again, in the picture anticipating consumer media use can be seen as a part of the beginning of the process.
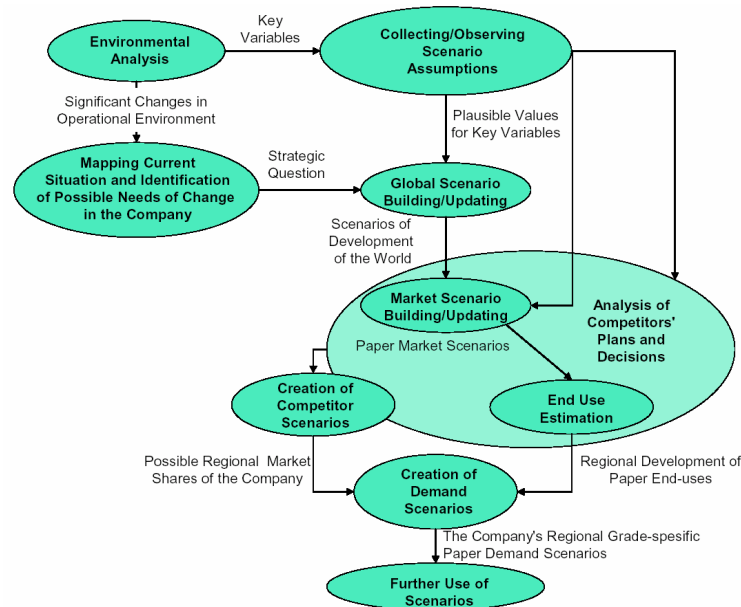
Figure 9 - Steps of a literature-based paper product demand estimation process (Lehtinen, 2006).

4.2. Econometrics of paper consumption

The first study using econometric methods to analyze forest product markets was carried out in 1954 (Pringle 1954). In the study newsprint demand in the United States was analyzed. Some organizations, such as the FAO[27] and US Forest Service, regularly produce long-term forest products projections. In the most classical model, the economic activity variable (GDP) and the price of newsprint are assumed to be determinants of newsprint demand, and thus they fail to explain the and forecast the structural change that took place at the end of the 1980s (Hetemäki & Obersteiner, 2001). Hetemäki & Obersteiner (2001) provides further insight into these and suggests a Bayesian model able to include expert's views and an ad hoc model having newspaper circulation as an explanatory variable. These projections and a projection provided by FAO and RPA are depicted in Figure 10. These estimates seem to rely too much on the previous paper demand development and thus fail to forecast the change in the trend.

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[27] Food and Acriculture Organization of the United Nations (FAO): http://www.fao.org/
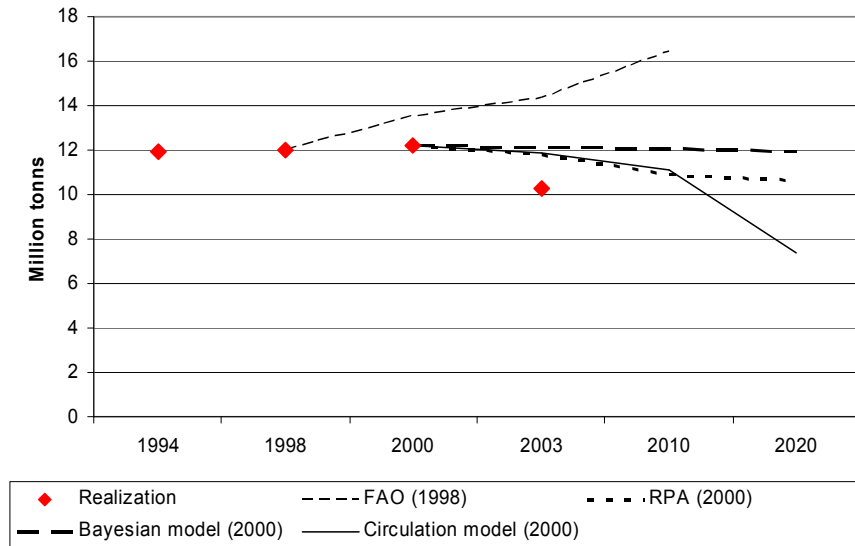
Figure 10 - Few econometric projections made in 1998 and 2000 with realizations.

4.3. *Paper Demand Scenarios*

Obersteiner & Nilsson suggest an analytic scenario model for producing paper product consumption projections (Obersteiner & Nilsson 2000). The rationale behind their model is to decompose aggregate consumption statistics into cohorts and then anticipate the reading intensity development within them. One scenario, "press-imistic scenario", was presented as an example. Projections fell surprisingly close with the later realizations - see Figure 11.

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Figure 11 - Newsprint consumption in USA according to "pressimistic scenario" using year 1998 as a base year (Obersteiner & Nilsson 2000). Realization provided by NAA[28] are marked as red diamonds.
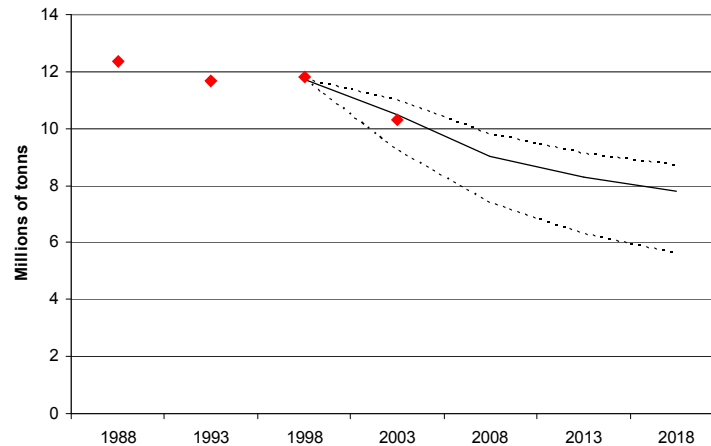
Jaakko Pöyry Consulting has provided a description of their scenario working methodology JP Viewpoint, which is developed to improve their ability to identify and monitor drivers altering their customers' business environment. In the process, scenarios are constructed in a joint and iterative process with the client. Workshops, joint brainstorming and expert consultation are used (see Figure 12). Process is used to address risks and opportunities, develop deep understanding of the critical drivers, relationships and their changes, identify critical weak signals, reduce the degree of uncertainty and provide an opportunity to express different opinions and views of the future within company (Leskijärvi et al. 2005).
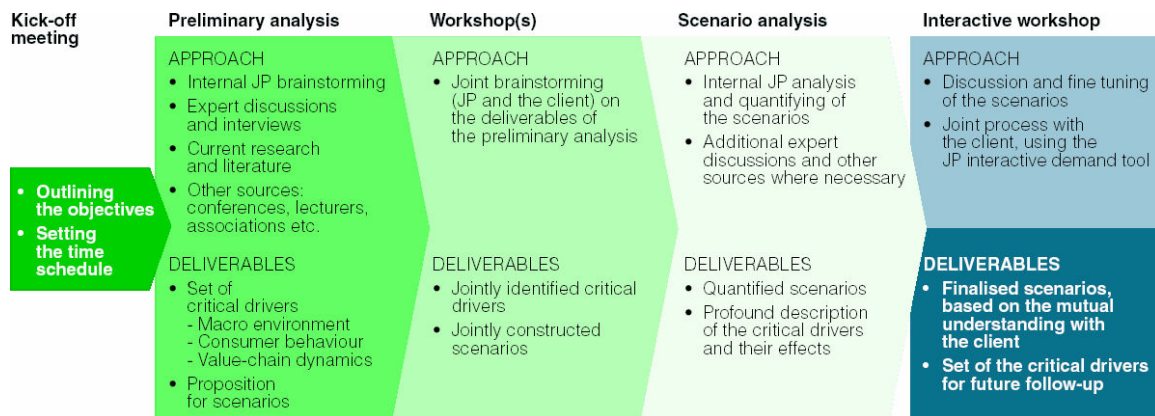

Figure 12 - JP View working process example.

4.4.   Advertising

World Advertising Research Center (WARC)[29] is the leading supplier of information, knowledge, insight and data to the global marketing, advertising, media and research communities, and provides forecasts on the media-specific development of advertising expenditure.
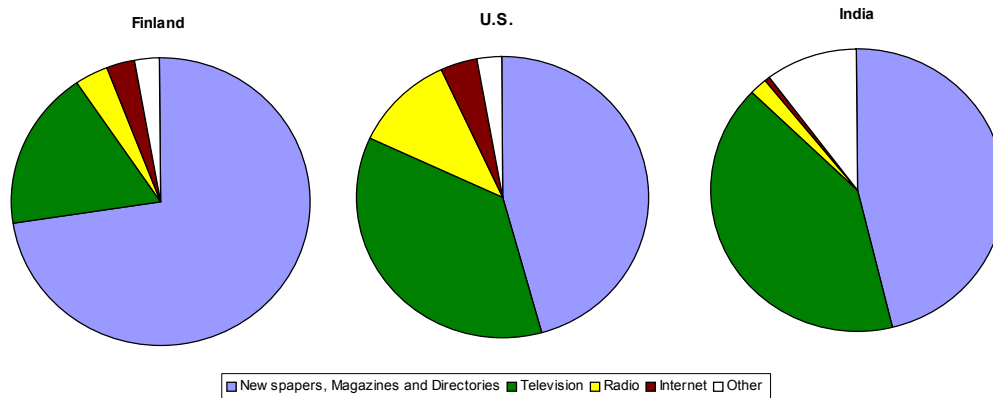

Figure 13- Advertising expenditure shares in Finland[30], USA[31] and India[32] in 2004.

Total advertising expenditures are expected to be rising. Direct advertising via direct mail is found less intrusive than telemarketing, less of a burden for consumers than email marketing, and more personalized and customizable than broadcast or printed media. Web-based advertising will probably also settle into the marketing mix as a complementary marketing tool rather than as a pure substitute for traditional media (Diakova, E., 2005).

4.5.   Paper Demand in China

Because of its rapid population an economic growth and urbanization, the importance of Asia in world forest product markets increases significantly (Hetemäki & Nilsson 2005).

In the 1980s, China's demand for newsprint was relatively low as the printing media sector was highly controlled by the government. Newsprint consumption started rising in the early 1990s, however, as the government gradually loosened restrictions on the number of newspapers in circulation and on the advertising space available.

He, D. and C. Barr have used a proprietary econometric model developed by China Economic Consulting Inc. to project paper and paperboard demand, supply and trade. The model employs a weighted average index based on real consumer spending,

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[29] WARC home: http://www.warc.com/
[30] European Advertising & Media Forecast, Feb2006, Vol. 20 Issue 3, p8-8.
[31] European Advertising & Media Forecast, Feb2006, Vol. 20 Issue 3, p25-25.
[32] European Advertising & Media Forecast, Feb2006, Vol. 20 Issue 3, p26-27.

investment, and net trade, together with projected GDP growth to forecast demand for the major grades of paper and paperboard through 2010. Historical data on pulp and paper demand and production have been obtained from the Almanac of China Paper Industry, published by the China Light Industry Association, and from the China Paper Association. (He, D. & C. Barr, 2004)
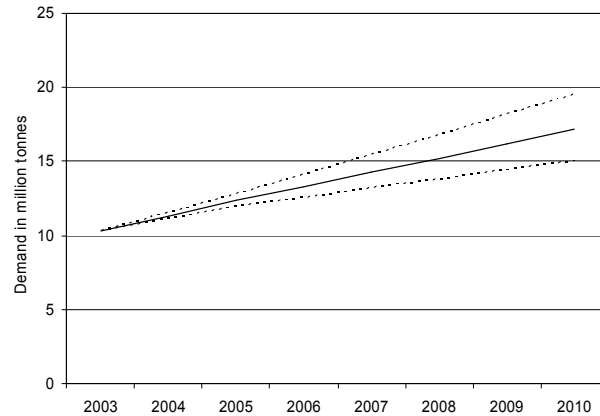
Figure 14- Projections of China's domestic demand for printing & writing paper 2003-2010 (He, D. & C. Barr, 2004)
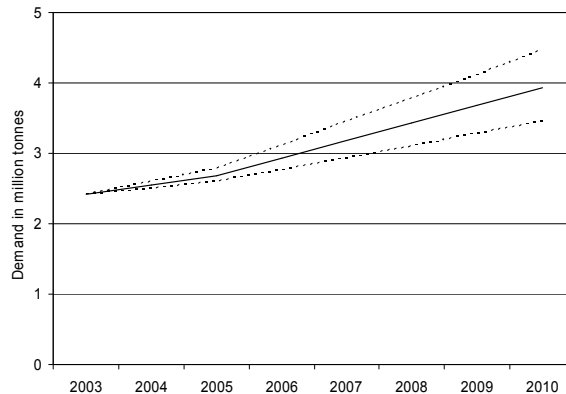
Figure 15 - Projections of China's domestic demand for newsprint 2003-2010 (He, D. & C. Barr, 2004).

Newsprint is mainly used for the publication of newspapers and the demand for this grade is closely correlated to the performance of gross domestic product. High GDP growth means rising personal incomes, which in turn, make newspapers more affordable. Other factors, such as advertising expenditures, literacy rates, pagination of newspapers and the development of electronic media, also affect demand for newsprint. (He, D. & C. Barr, 2004)

In China, a large portion of uncoated paper is used to produce textbooks, exercise books and notebooks. This is due to governmental regulations stipulating this material to be relatively affordable. As a result, profit margins have been relatively low for publishers

of textbooks and producers of exercise and notebooks, and most coated paper is used for commercial publishing of books, magazines, catalogues, brochures and calendars.

PART II: Cases

In this part we are going to present some applications of the methods described in the part I. The applications are structured in a form of four cases and they concern the paper consuming and media behavior issues from different perspectives. The main idea with the cases is to give the reader a more concrete view of benefits of the foresight methodology and shed light on how they can be applied to concrete business problems.

We also show how they different methods can combined and linked together to achieve a more comprehensive view of the problem. Moreover, the cases combine the presented methods with the substance, i.e. to the determinants of consumer media behavior and media platform characteristics. In a nutshell the cases discuss the following issues:

- Case 1 suggests an approach how to produce long-term paper demand scenarios, where the changes in business environment (e.g. substitution to digital media and demographics changes) are explicitly addressed.
- Case 2 combines the factors influencing consumer media behavior to product characteristic by exploiting portfolio modeling and Delphi-methodology.
- In Case 3 a more qualitative perspective is taken and scenario working is applied to study of policy factors.
- Case 4 presents a concrete example of how a single project can possibly affect global paper consumption what actions a paper producer could take to control the development.

5. Case 1: Constructing Long-term Market Demand Scenarios Responding to Continuous Changes

Providing an analytical framework is arguably necessary in order to build quantitative scenarios, and exploit existing statistics and surveys as well as, expert opinions on future technologies, consumer media use and world development (Obersteiner & Nilsson 2000). Therefore we present a bottom-up foresight process, drawing on the process described in Oberstein & Nilsson 2000, to produce baseline paper demand scenarios capturing population dynamics, continuous product evolution and continuous changes in media product usage by cohorts.

In Oberstein & Nilsson work they addressed newspaper demand by (i) decomposing current paper consumption statistics into population cohorts, (ii) anticipating time-wise trajectories of cohort development, overall reading intensity and newspaper readership and (iii) composing an aggregate forecast and "paperscapes", i.e. geographical distribution of paper consumption. The process is depicted in Figure 16. Unlike Oberstein & Nilsson, we formulate a model and a process to produce paper grade-specific demand scenarios derived from the consumption of different media products. Furthermore, we stress model construction instead of providing a ready-made forecast framework.
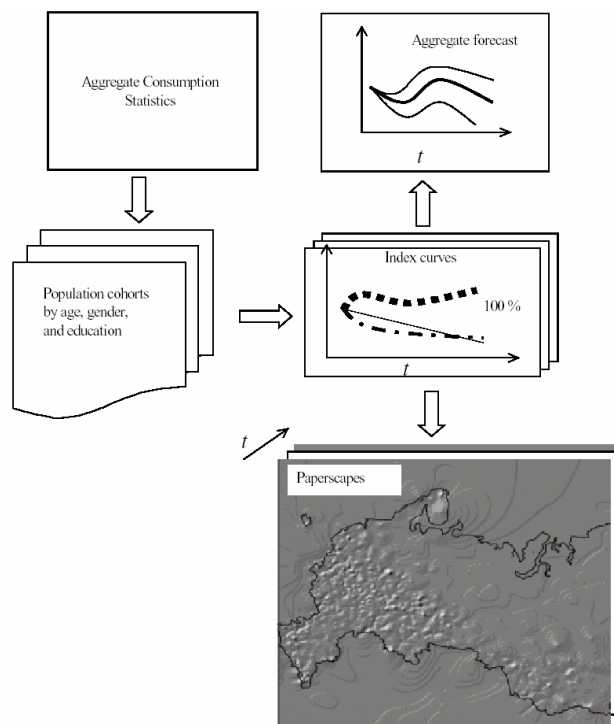

Figure 16 –The scheme of a long-term newspaper scenario model (Obersteiner & Nilsson, 2000).

As the resulting consumption scenarios address only coarse location-specific overall paper demand, they provide an inadequate picture of the true total paper demand of a

specific paper grade ultimately facing the company. In order to form a foresight process encompassing also competitor's plans and decisions and more detailed grade-specific market demand, a process somewhat similar to process depicted in Figure 9 is required (Lehtinen, 2006). Long-term market demand scenario construction described in this case study corresponds roughly to the Market Scenario Building/Updating –step in Lehtinen, 2006, an important difference being the longer time horizon.

5.1. *Description of the Process*

The traditional forest sector models used for demand forecasts only predict some "average futures" based on extrapolation of the past. However, innovation driven dynamic systems are likely to lead to technological equilibria that are far from this "average future". Thus, traditional models are incapable of assessing the full range of risks in a technology driven market. Today decision-makers need tools to explore and understand the system they operate within in order to be able to act as a pro-active mover supported by rehearsed ex-ante strategies. A scenario model in which the forecasts are based on trajectories of population and economic growth, changes in life and working styles, substitution behaviour, and technological change for individual population cohorts, is therefore suggested (Obersteiner & Nilsson, 2000).

Loosely drawing from Obersteiners' & Nilsson's work, we now present a scenario forecasting process addressing future development of various media products as regards to their consumer demand and paper intensiveness.

Scenario building process, depicted in Figure 17, proceeds as follows:

(1) Define the model properties such as time unit (e.g. 5 years), time horizon (e.g. 15 years), population breakdown into uncoupled and coherent cohorts (e.g. by age, gender and educational attainment), set media products (e.g. newspaper, TV-news, internet news and handheld news service), i.e. medium and content, whose development to address and a measure for media product use intensity.

(2) Initialize the scenario model by establishing a base year. The base year is established by decomposing the current paper consumption statistics into individual cohorts and individual media products. The required information is available on various national and international sources (Obersteiner & Nilsson, 2000).

(3.a) Define perspectives from which to address the development of time-wise development of media products in different cohorts (e.g. to address the development of a particular cohort or the development of people having specific characteristics at the estimated times). Anticipate the trajectories using surveys, media forecasts or expert opinion.

(3.b) Anticipate the development of population cohort sizes by using existing statistics and demographic reports.

(3.c) Anticipate changes in products that contribute to paper grade specific consumption statistics, e.g. paper grammage, use of different paper grades in a particular product and the number of editions.

(4) Putting all together we will have a quantitative aggregate paper consumption scenario, which can be broken down into geographical demand through the geographical distribution of population cohorts.
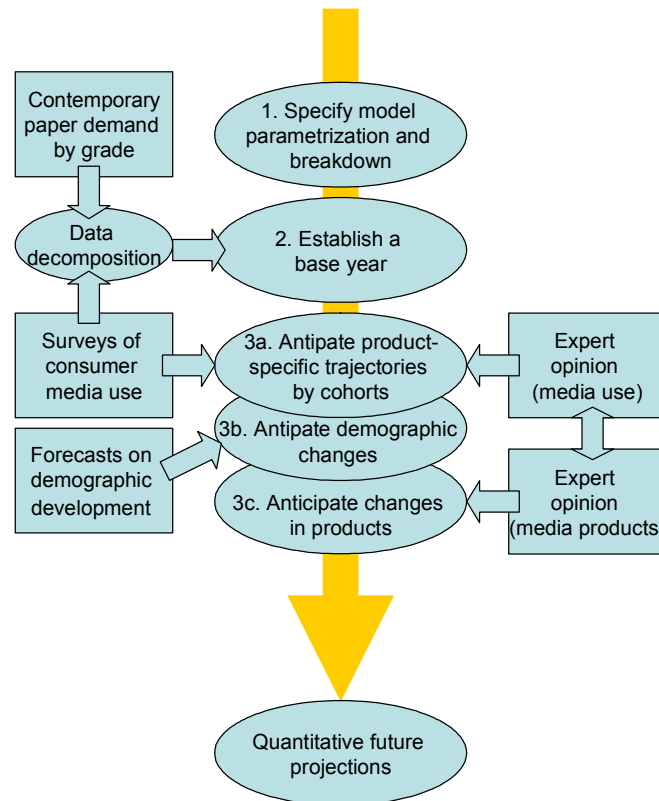
Figure 17 - Paper demand building process.

Model can be used to produce several scenarios differing either by their structure, anticipation perspective or data. Therefore the model can be used to highlight (i) critical assumption in the model structure, (ii) differences in estimates due to point of views, and (iii) critical developments, products, cohorts e.g. especially strongly influencing the consumption of a particular paper grade. Considering diverse scenarios also provides further insight into market dynamics, world development and consumer media use.

5.2.   Model in Mathematical Notation

The total consumption of particular paper grade q in year t is denoted by c_{qt}, and it is composed of consumption of paper grade q due to the consumption of all the media products $\rho \in P$. The consumption due to a particular media product is determined by (i)

the intensity of the paper grade in the product and (ii) the overall consumption of the product over all population cohorts. Thus summing over all the media products and all the population cohorts we get the definition

$$c_{qt} = \sum_{\rho \in P} \left[s_{\rho qt} g_{qt} \sum_{c \in C} (\phi_{\rho ct} p_{ct}) \right].$$

p : Size of a particular population cohort at a particular moment.

ϕ : Use intensity of a particular product of a particular population cohort at a particular moment.

s : Product use intensity in terms of a particular paper grade at a particular moment. Thus in terms of e.g. number of pages, size, and average number of editions per reader.

g : Grammage of a particular paper grade in use at a particular moment.

P : The set of media products.

C : The set of population cohorts.

5.3.   Model Definition Aspects

5.3.1.   Division into Cohorts

Cohort partition should be such that cohorts would be both useful and observable. Former requirements are defined as regards to heterogeneity in demand trajectories of products, i.e. it wouldn't be justifiable to use gender as a dividing factor, unless at least some of the products in question can be distinguished as ladies' products and men's products.

A population traditional breakdown as regards to use of media would be age, gender and educational attainment. Having, for example, two classes for gender (male, female), three for education (high, medium, low) and 20 for age (ages 0-4, 5-9, …, 90-95, 95-) altogether 120 cohorts are defined . In practice, a vast number of cohorts like this implies that it is not possible to address every cohort one by one, thus it of use to assume the effects due to cohort characteristics as independent – e.g. for the former construction this would reduce the degrees of freedom from 120 to 25.

5.3.2.   Perspectives on Trajectories

If we anticipate use intensities of the products from base year 2005 to year 2020 by estimating the use intensity of a particular product by a particular cohort in every two-and-a-half years, we will have a very large number of point estimates. Therefore it is suggested that instead of addressing use intensities as point estimates, the estimates should be presented as trajectories.

However, in such a multi-dimensional model there are diverse perspectives from which these trajectories can be addressed. The estimation perspective should be chosen so that the estimated trajectories (i) embody an intuitive entity or process, (ii) have a minimal inter-trajectory coupling, and (iii) are observable and anticipatable. It is to be noted that most likely evaluation of trajectories from different perspectives, using e.g. expert opinion or surveys, may produce a dissenting point, and therefore multi-perspective evaluation can be used as a sensitivity analysis of a kind.

Some, rather intuitive perspectives are suggested:

(i) Addressing the time-wise use intensity development in a particular group characterized by time independent qualifiers, e.g. how media product usage will develop among young adults of age 20-25 with low educational attainment. This perspective stresses on media product consumption due to characteristics such as age and education, e.g. it is assumed that reading fashion magazines is more like associated with phase of life than with generation.

(ii) Addressing the time-wise use intensity development in a particular cohort, e.g. how media product usage will develop among people, who were young adults of age 20-25 with low educational attainment in year 2005. This perspective stresses on media product consumption as a generational issue and highlights the fact that people tend stick to their habits and therefore have persistency in their actions, e.g. it is assumed that people now of age 35-40 are more reluctant to adopt reading sports news from a handheld than youngsters now of age 10-15 due to force of their habits.

(iii) Addressing substitutive or complementary characteristics of particular products in a particular time period in a particular cohort, e.g. visiting hobby web-forums in the Internet substitutes reading of hobby magazines. This perspective stresses the relationships between usages of different media products, and therefore the time-wise development of such products must be anticipated together.

5.3.3.   Measures for Product Use Intensity

In the presented framework the use intensity variable serves as an intermediary variable to entwine media products and paper consumption. However, there is no single definition or quality attribute for use intensity. A prevailing approach is to measure usage in hours (Szeto, C. & L. Jimenez, 2005). From this perspective consumers have a limited amount of hours that they divide among chores. Another approach is to focus on preferences i.e. given function which media is preferred to another or which is perceived as the most effective (Szeto, C. & L. Jimenez, 2005). A measure first and foremost determining product consumption is the number of subscriptions and purchasing transactions.

It should be noted that as there is no measure above others, we still have some requirements that the intermediary variable must meet. The intermediary variable should be (i) rich in information, i.e. capture the most essential characteristics of the development, (ii) observable cohort-wise, (iii) anticipatable time-wise, and (iv) rigorously related to the consequent paper consumption. In a way or another, intermediary variable is a compromise between these, e.g. newspaper subscriptions are readily observable and

straightly related to paper consumption, but because of e.g. the binary nature of a subscription, tell little about underlying media usage. If we assume that once reading intensity, in terms of the percentage of news read from a paper media, slips below 10 %, newspaper subscription is cancelled, we get an effect illustrated in Figure 18 - although the average reading intensity declines linearly, drop in subscription rate is steep and unexpected and vice versa.
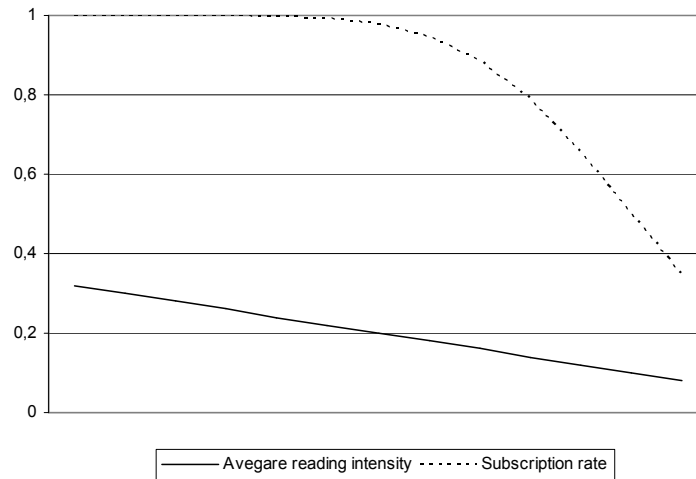

Figure 18 - An example of relation between average newspaper reading intensity and consequent subscription rates. Here the newspaper reading intensity is assumed to be normally distributed.

The concept "using a media product" can simply stand for the use of a particular medium & content -bundle, i.e. media product, in general, or more elaborately address the use of the media product for a particular purpose in a particular context with particular intensity. The downside in the elaborate breakdown is that the count of products explodes, e.g. daily reading of newspapers at work is a product different from daily reading of newspapers at home.

6. Case 2: Competing Media Platforms and Evaluating Their Strengths and Weaknesses

A high number of emerging new communication technologies demand for tools to judge their threat for paper-based media products. Almost everybody has an opinion about this subject and many speculative predictions about the future of paper. For example, when the television and the radio were introduced, it was believed that they would soon replace newspapers and magazines completely. But as we all know, in many cases consumers still prefer reading newspaper to watching TV. However, for corporate decision making these speculative statements are not a well-founded starting point, instead more formal and quantitative methods are needed. From this perspective, what will be the preferred

media platform for consumers in the future is a salient problem for the media cluster companies.

In this chapter we are going to present a process and methods that can be used to tackle this problem and to exploit in evaluating media products and technologies in different applications. The approach emphasizes the importance of extensive co-operation obtaining comprehension of consumer behavior and its effects to paper-based media. The goal is that with the help of the tools presented in this chapter, we could estimate how the new technologies and products would affect the consumption patterns and how to be able to react upon those changes.

6.1.   Overview of the Process

The presented method is a plain bottom-up approach, which starts from the most elementary determinants of paper consumption, i.e. consumer behavior drivers. It is also more qualitative than quantitative and the modeled changes are of continuous nature, although the emerging of a completely new technology can be seen as discontinuous change. The process can be used in explorative sense to sort out the competing products or as an action oriented process to help with product portfolio selection and research and development focus. It also links together the factors presented in chapter 5 (e.g. interactivity, convenience etc.), consumer characteristics, consumer needs and products characteristics.

The process is divided in four main steps, which can be linked to other foresight methods, such as innovation stores and Delphi-studies. In a nutshell the process can be described using the following steps:

1. Identifying and selecting the factors affecting media consumption relevant to studied case

2. Ranking the relative importance of factors for example with the help of a Delphi-study of marketing research

3. Selecting the media products and possibly innovating new products to be evaluated

4. Evaluating the listed product in terms of the factors to find out the most promising (new) products
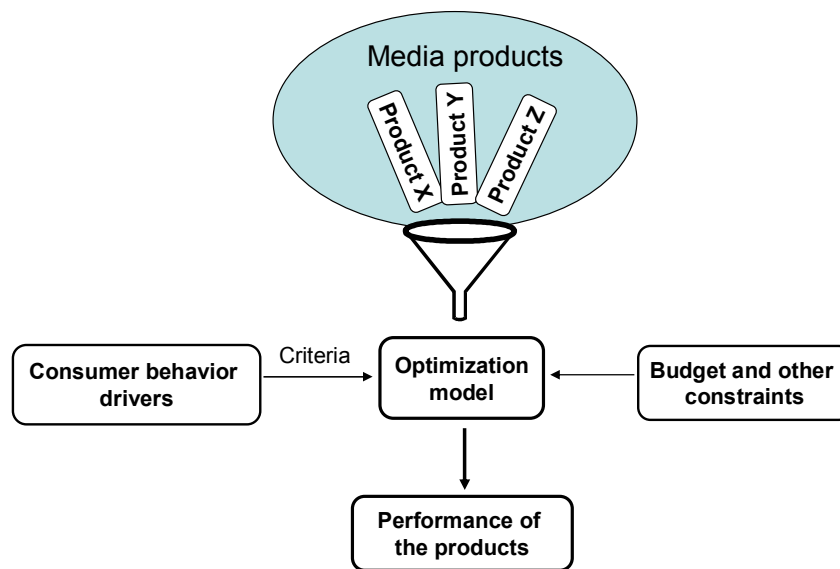
Figure 19 An overview, the inputs and the outputs of the process

In essence the step 1 defines the scope of process. For example, we may be interested of suitability of our and competing products or in estimate the overall consumer attitude to different products. Thus we want to select only such factors that are relevant in the selected perspective. If we need to have a comprehensive list of factors for a general study of media consumption, it can be obtained from relevant researches and by brainstorming.

The step 2 is somewhat critical to the results of analysis. Due to this and uncertainty of the future development, the decision makers are not asked for absolute judgments about the importance of criteria and the performance of the products. Instead the relative importance of criteria is assigned by judgments criterion *x* is *more important* than criterion *y*, but we need (or want) to precisely say *how much* more important. The incomplete information is handled by the optimization model, which makes possible to do a sensitivity analysis of the results.

In the step 3 the products to be evaluated are selected. This phase can include a separate innovation process, which is used to generate products or the product idea can be taken from company's innovation store. The last step puts together the results of the earlier phases and evaluates the products in terms of the selected criteria. The analysis is done by a method called *Robust Portfolio Modeling* (see section 7.4) which can handle the multiple criteria and incomplete preference information. The practical arrangement of the process, which is discussed in section 7.5, is a bit different depending on whether we are

actually making decisions about the product portfolio or just doing an explorative analysis.

The main outputs of the process are potentially promising media products and parameter estimates of for example popularity communication method for statistical models. But once again, the information collected during the process is important and gives more holistic view of the possibilities and the threats of printed media.

6.2. *Foresight in Micro Level*

In the foresight framework collaboration between individual companies and institutes is classified as micro-level foresight. A lot of micro-level foresight is carried out by firms especially in technology field, but the processes are seldom reported to the public (Kuwahara 2001). However, it has been widely accepted that the micro-level foresight is a useful addition to macro-level foresight and can aid decision making process (Martin 1999).

The micro-level approach tries to deepen the understanding of market drivers by tight co-operation with individual companies and organizations. It also emphasizes the platform provider role of paper products by contrasting them to other media products. Micro-level analysis can also be used to judge the feasibility of macro scenarios. For example if it seems that consumers clearly prefer paper media convenience to digital alternatives the most pessimistic paper demand macro scenarios should probably be revisited.

6.2.1.　　　　Co-operation with and within the Media Sector

Foresight approach emphasizes that instead of passively forecasting the course of events, we should try to influence it. However, one company or even industry sector has very limited possibilities to control the course and therefore co-operation between media and paper sectors plays a very important role in the process. The production technique focused R&D perspective of the paper industry has not encouraged working hand in glove with media cluster customers such as publishers and advertisers. But the changing business environment and the threat of diminishing paper consumption forces paper manufactures to seek for new ways to forecast future developments and even more importantly ways to influence an ongoing change.

The key stakeholders in the co-operation are publishers and advertisers, which have the most first-hand information on consumer preferences. Also some research institutes have activities in exploring the future of media sector and printed media. The motivation of media companies to collaborate should not be a problem, as both parties have many common interests. In particular the advertisers are very interested in what is preferred media platform for consumers, so that they can direct their investments as efficiently as possible.

Some interesting researches have been conducted by the Electronic Document Systems Foundation (EDSF) and InfoTrends/Cap Ventures. ESDF has discussed the effect of digital media on printed media in articles "*Printing in the Age of the Web & Beyond*" and

"*Network, Screen and Page: The Future of Reading in a Digital Age*"[33] but unfortunately the publications are not free of charge. InfoTrends offers market search services and multi-client studies, of which some interesting are "*The Future of Paper*" and "*The Chinese Printing Market: The Next Big Opportunity for Digital Printing & Workflow*?"

6.3.   Identifying Relevant Factors

The key to feasible paper demand projections is the deep understanding of factors affecting consumers' media behavior. This is also a prerequisite for being able to utilize weak signals and innovative new product development. The ever increasing competition from digital media means that also paper based media has to find new ways for growth by investing research and development. It's also assumed that media sector has a lot of untapped innovation potential, which makes the approach feasible and promising (Siivonen et al. 2003).

A proactive strategy starts with identifying the factors influencing media consumption and searching for new innovative media products, which are rated in terms of the identified factors. For a reference some examples of possible factors are discussed in chapter 5. The issue has gained attention neither in academic nor business literature, in fact, we weren't able to find any fully relevant article. The focus of most marketing studies is what media are preferred by consumers leaving the question of their motives unanswered.

To obtain a more comprehensive and quantitative view of the consumption drivers, the Delphi method can be a useful value. It is particularly well suited for the problem both because the output can be directly utilized for evaluating the products (see [evaluating products]) and because the process itself fosters diversity in factors. Because the factors likely vary, for example, across geological location, age cohorts and socials, it is very important that the background of the participants of the Delphi process is heterogeneous enough. As the process communication can be easily implemented with the help of the Internet, this should not be a problem.

Marketing research is also a common and a straightforward method for recognizing media consumption drivers if it is conducted duly. Perhaps a more sound approach is to use consumer workshop, where the process can be controlled. With consumer surveys the main problem is in finding a representative sample. First the way (online, mail or telephone for example) how the survey is conducted affects what kinds of customers are reached. Second it is not self-evident that consumers themselves are aware of the relevant factors. Due to expensiveness of surveys and the problems presented above, it may be well advised to stick with the available secondary information.

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[33] EDSF Articles: http://www.edsf.org/news.cfm

6.4.   The Innovation Phase of the Process

The big innovation potential of media products unfortunately does not mean that it's easy to come up with lucrative product ideas. But with the help of deep understanding of consumer behavior drivers this might easier. The main problem lies in the variety of substitute technologies and their relative competitiveness: a development team with too narrow a background will not be able to correctly estimate the potential of the invention compared to competing products.

Instead of to coming up with new innovations this approach can also used to evaluate ideas collected in innovation stores. However, when using the ideas generated of some different or general purpose, we must make sure that large enough focus is still achieved. For example, if the company's idea store is loaded with media products using paper as platform, the result of evaluation phase will be skewed.

6.4.1.   Applying Delphi method

Generally less formal processes such as brainstorming are favored by many companies in micro-level foresight. In many cases this may be a favorable approach, but when we are studying such a wide framework as media products, much attention should be paid to the heterogeneity of participants and avoiding influence of dominating opinions. Many experts of certain technology often have myopia for the possibilities, which will lead to very biased results. In many group processes also bringing together the geographically distant participants would be relatively inconvenient.

Due to the challenges presented above, using the Delphi method in the innovation process is encouraged. As described in chapter 3, the Delphi technique is a widely exploited group process which aggregates subjective probability judgments on a particular topic given by various experts. The experts could, for example, estimate when and which technologies will become serious substitutes for paper and from these estimates we could calculate probability distributions for the appearance of competing technologies.

A great challenge is the effect of currently unknown and unexpected technologies. For example, a breakthrough in nanotechnology could boost e-ink development, which would certainly dramatically affect the viability of other digital media technologies. The Delphi-method has a varying track-record in cases with very high uncertainty. It is open to discussion if the poor performance is due to the flaws of the method or just to the unavoidable nature of those cases.

6.4.2.   Media Gaps method

A more straightforward method for the product ideation, called searching for media gaps, is proposed in (Siivonen et al. 2003). Media gaps are unemployed communication technologies for example in terms of lead time in communication and reachable audience.

In the analysis different media technologies or products are plotted in terms of two characteristics, so that characteristic A is fixed to horizontal axis and characteristic B to vertical axis. The characteristics used for plotting can be chosen freely, but it's natural to

use the factors affecting consumer's behavior in order to judge how well the current technologies perform in regards to the customer's expectations.
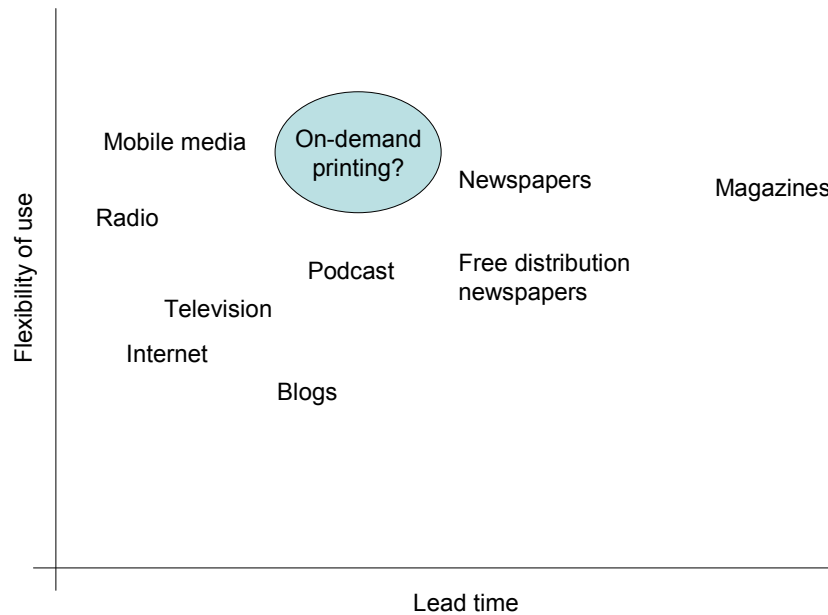

Figure 20 Example of media gap chart

As an example, in *Figure 20* is presented some of the most common media platforms and their performance in terms lead time in communication and flexibility of use (in terms of place and time). From the figure we can see that between radio, mobile media and newspapers there is gap, which could be filled by for example on-demand printing. On-demand would printing faster and more flexible as the content can be printed only when needed (so it is always fresh) and the product can carried and used in anywhere anytime, . To obtain more wide perspective the potential products should also be evaluated with others other criteria, e.g. on-demand printing could be evaluated in terms of audience attained, cost of distribution, convenience of use etc.

Adapted for the foresight framework the process includes four phases in essence:

1. The selection of characteristics used for evaluation and plotting the current products

2. Identifying currently unexploited gaps, which are feasible or potentially promising

3. Using brainstorming or some another ideating process for coming up with possible solutions to fill the gap(s)

4. Evaluating the technology need for the solution and projecting the demand potential

6.4.3. Evaluating the Interdependencies of Technologies

One of the shortcomings of the Delphi method is its' inability to take into account the influence that different future paths may have to each other. When considering the development of media and communication technology it seems reasonable to assume that the adoption of one technology directly affects the attractivity of other technologies. For example, successful commercialization of paper-like electronic display will probably render tablet-pc technology obsolete.

Cross-impact analysis is often considered an extension to the traditional Delphi, as it tries to overcome the bias caused by mutually exclusive developments and process of forecasting events separately. The initial association with the Delphi method does not, however, mean that it can't be used separately.

The process can be arranged in the same way as Delphi, but in addition the experts are asked for additional pair-wise conditional probabilities for events. Also more attention should be paid for the selection of the evaluated events or technologies to keep analysis from getting too complicated.

6.5.   *Evaluating the Products in Terms of the Identified Factors*

Regardless of the underlying R&D process or how the criteria are chosen, the most important part of the process is evaluating the products in regards to consumers' expectations. Instead of considering individual products separately, a more comprehensive and robust approach is evaluating the whole product portfolio.

A typical characteristic of the media and paper industry is high uncertainty of future development paths and therefore the aspect of incomplete information must be explicitly addressed by the evaluation method. Also in a very uncertain situation like this, searching for one optimal portfolio makes no sense. Instead we should try to identify some robust product choices, which perform well in every probable scenario and handle the contingent products by others means.

The selection of product portfolio is a typical complicated decision making situation with multiple objectives, incomplete information, large number of projects and high uncertainty. A sheer number of different approaches for this problem are presented in literature and used in practice. The most straightforward strategies are assigning some financial criteria, such as NPV or IIR for individual projects and modeling the selection and a knapsack problem (Lindstedt et al. 2005). However, these methods have several critical shortfalls. Estimating the NPV for a completely new media product is extremely challenging, not to speak of inclusion of project risks by using vague discounting factors drawn from the hat. In addition it is inevitable that the interdependencies of projects are not captured in this framework (Liesiö et al. 2005).

In many companies implementations of different scoring models are also quite common. It is argued that in practice the scoring models usually outperform the using of pure financial criteria. Even though the performance of the scoring models is acceptable, their theoretical foundation is somewhat questionable. The main problem is the aggregation of criteria specific scores: usually this phase neither captures decision makers' risk preferences nor enables sensitivity analysis (Lindstedt et al. 2005).

Many more sophisticated methods are presented in academic literature, but they are seldom made use of in practice, probably because of the complexity of the methods themselves and high requirements of input data. With challenges listed above in mind, a new approach called *Robust Portfolio Modeling* has been developed in System Analysis laboratory at Helsinki University of Technology. The method has been applied in several different cases, such as the selection of road pavement projects and strategic product portfolio selection in a Finnish telecommunication company and the results have been quite encouraging (Liesiö et al. 2005).

6.5.1. Applying Robust Portfolio Modeling

In essence robust portfolio modeling (RPM) extends the preference programming[34] to portfolio selection problems. RPM tries to solve the problems associated with many alternative methods used for (project) portfolio selection: it can capture decision maker's risk attitude, it does not rely on precise input data and the process and the output are transparent and understandable also for those with non-mathematical background. The projects can also be evaluated separately in order to choose only some promising projects. In Figure 20 an overview of a general RPM-process in presented, for a more exact description of the RPM-method, please see (Liesiö et al. 2005).

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[34] An extension to analytic hierarchy process (AHP) that allows expressing decision maker's references as intervals (Salo and Hämäläinen 1995).
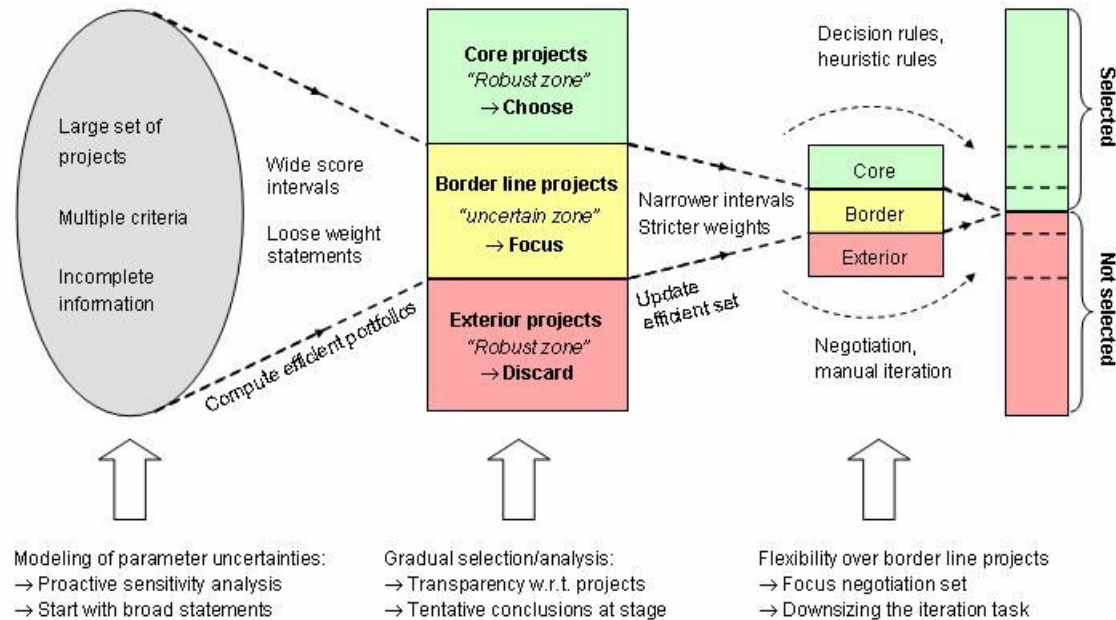
Figure 21 The RPM-process summary graph (source: System Analysis Laboratory/TKK)

In this case RPM is used to evaluate the competing media products using the factors affecting media consumption as criteria. At this point it is irrelevant how the products and criteria have been selected, which makes the process more flexible. The input data simply consists of a list of proposed products, the relevant factors we are interested in and budget or other resource constraints. The incomplete information consists of uncertainty relative importance of factors affecting consumption and how well the products fulfill the criteria.

RPM can be integrated to the general corporate strategy process by the corresponding selection of input product and criteria, or by ex post judgmental analysis of robust and contingent product choices. It's also possible to use different scenarios to capture the uncertainties; however this approach has not yet been applied to cases with interval-valued multi-attribute outcomes in scenarios. This way the information of scenario-based foresight process can be incorporated to product and consumer preference framework.

Generally the preferred way to arrange the RPM-process is setting up a workshop where decision makers discuss overall strategy and issues that are not captured by the model. However, if the purpose of the process is only explorative, evaluation phase can conducted for example as on-line questionnaire and the analysis itself is carried out by specialist.

The output of the process is collection of *non-dominated portfolios*, that is, portfolios that are efficient in respect to available information and a *core index* associated with each project (or product in this case). The core index tells to how large part of non-dominated portfolios the particular project belongs. In other words, a project with core index 1 belongs to all efficient portfolios and so it is a robust choice.

6.5.2. A Hypothetical Illustrative Example of the Process

In general we might be interested in suitability of different media products to a particular application such as searching for information or relaxing. If this is the case, we just select relevant criteria and products and relax the budget and other resource constraints and think that all products consume the same amount of resource. If the importance of factors is expected to change, the effects can be easily illustrated through sensitivity analysis by changing the criteria weights.

Let's assume that we have a set of products, which we want to evaluate in terms of criteria important for relaxation. These criteria can be for example convenience of use, interactivity, aesthetic character. As a result a group process we have defined the relative importance of the criteria (e.g., convenience of use more important than the level of interactivity) and the workshop participants have evaluated the products. From the evaluations the product scores and confidence intervals are calculated.
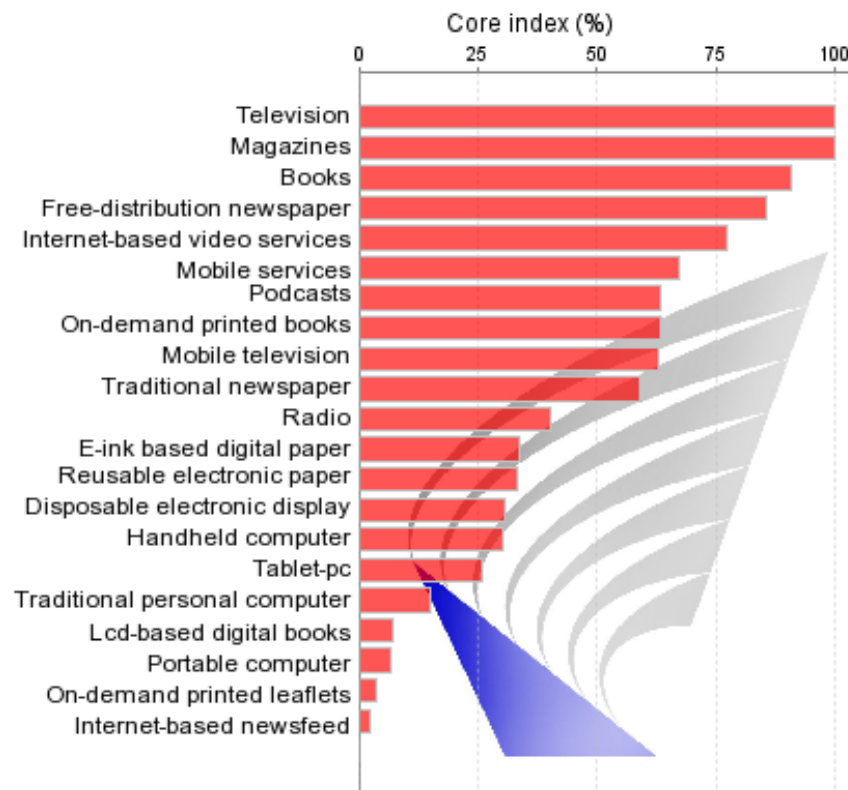
Figure 22 Hypothetical result from an example study (Image adatped RPM-Explorer's[35] user interface)

In Figure 22 is presented products and their suitability to relaxation purpose in terms of the selected criteria. The image is taken from RPM-Explorer, which make possible to interactively visualize the results of analysis. If the products were such paper-based products, from which we were selecting the product portfolio, the two products with core index 100% would be robust choices because they are include in all efficient portfolios. The selection of additional products could include taking additional aspects such R&D synergies overall strategy focus etc. in consideration.

6.6. Conclusions

A whole-hearted study of alternative media products and communication technologies can be useful when we are trying to understand the macro-level trend in more detail. It enables us to identify the possibilities and prepares us for the threats. Thought presented methodology tries to capture the most of relevant determinant of consumer behavior and consumption drivers, it can not address all aspects of the problem. For example political decision about education can substantially change the consumer preference in unexpected way.

While it's clear no method can guarantee to lead us to the right decisions, the best we can do it's to build decision on well founded basis. This means that we should make a distinction between a well-founded decision and a lucky outcome. The presented process is designed to be transparent and to clearly bring out what things are taken into consideration and what not. It leaves space for more judgmental and subjective statements in decision making process.

7. Case 3: Using Scenarios in Identifying Influential Policy Factors

7.1. Introduction

As already stated in the chapter 2, in many situations traditional forecasting tools such as statistical models are simply not applicable. These situations usually consist of uncertainties or discontinuous changes, which are hard to predict. A modern approach to these kinds of changes is preparing through scenarios. Scenarios are convenient for evaluating the long-term importance of different factors such as global economic development, societal changes, governmental settings or environment issues, just to name

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[35] RPM-Explorer, an interactive tool for exploring results based on Robust Portfolio Modeling
http://www.rpm.tkk.fi/explorer/

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a few. On the other hand, scenarios are also useful in more detailed issues, such as press deregulation in developing countries. In general, scenarios provide a sophisticated tool for studying both continuous and discontinuous changes.

Next is presented a possible process for scenario use in paper consumption foresight. The focus here lies on the developing countries, although scenarios can provide a helpful tool to foresight also in the western markets. If not mentioned otherwise, the chosen examples are taken from the scenario bank of Millennium Project of the American Council for United Nations University. In scenario creating section is utilized the article by (Leskijärvi et al. 2005). As a supporting example of scenario adaption and application is used a study of UK futures named "Foresight Futures 2020[36]".

The process consists of roughly four phases. First, the client should decide the framework of the scenarios and establish a selected group of experts who will construct the scenarios. Second, chosen experts must find the essential results or consequences of the scenarios. As an example, if the scenario would handle the economic development of China, this would cover the development of purchasing power, level of education or the change of consumer needs considering the media usage. Third, the effects to paper consuming should be defined. The second and third phase can be expressed together as adapting the scenarios. Last, the client should carefully analyze the effects and include the central findings to its decision-making process.
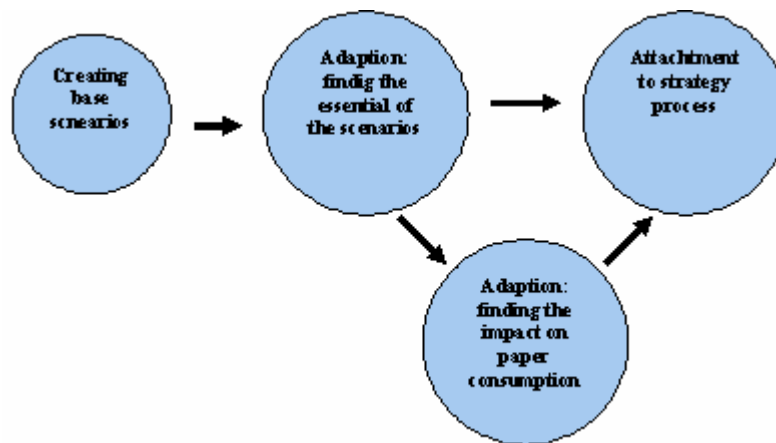
Figure 23 The process flowchart

The process aims at increasing the knowledge and developing the way of thinking about the future, not at taking specific actions or making one-time decisions. The output is thought to be mostly qualitative but with expertise and analysis, also quantitative data such as growth rates or probabilities can be achieved. It is, however, worth questioning whether the usage of uncertain figures such as "subjective probabilities" is sensible at all (Van der Heijden 1997). Some thoughts about the usage of the information (that is: including scenarios to the client's strategy process) are provided in the chapter. 7.4.

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[36] http://www.futurestudio.org/

7.2.   Creating Scenarios

The first phase of the process is generating a set of scenarios that handles the selected subject. As it is most of the times absurd to think that political or economical scenarios should be created inside a paper company, the client should only define the subject of scenarios and the constructing group. Usually scenarios developed by a certain group are not very meaningful to others outside the group (Van der Heijden 1997). This means that although the scenarios are made by outsiders, the adaptation of these scenarios should be made by the client in co-operation with the experts. This ensures that the scenarios will be usable to the client. Next is given some thoughts of what kind of an expert group should be brainstorming the scenarios in the first phase.

First of all, economics play such a big role that all kinds of scenarios should be built with economy expertise. Also the researchers of the chosen subject should be included (i.e. freedom of speech, communism, terrorism), preferably from both western and local universities. Surely, expertise of history would be an advantage. What is more, often "field expertise" of people from different associations (UN, religious organizations etc.) could be utilized. Altogether, the group should be as versatile as possible and preferably also the people should be available later on, if needed.

As already mentioned, no references to paper consuming should be made in the first phase. Therefore, depending on time and other resources, it is possible to use existing scenarios (i.e. the already mentioned UN Millennium project) and move straight to the adaption phase. In this case, the phase one of the process would be validating the scenario creator and making sure that the scenario is usable.

7.3.   Adapting the Scenarios

This phase consist of finding out the essential of the scenarios. First, one should identify which factors (see chapter 5) are affected and how they are affected in different scenarios. Using "China in the 21st Century: Long-Term Global Implications" as an example, a paper company would be interested on answering questions such as: What happens to people's media consuming needs, if they get richer? If the country does not meet expected growth rates, will the digital media spreading slow down?

According to (Foresight Futures 2020), the ability to answer questions mentioned requires (i) identification of key drivers (e.g. social preferences, political development), (ii) an assessment of the links between drivers and relevant trends and (ii) specialist knowledge of the sector. Therefore, an ideal scenario analyzing group should include in addition to scenario makers different specialists and people from the company side.

The second part of the scenario adaptation is made inside the company, possibly expert-aided. The aim of the adaptation is to screen the significant findings. Here, the company should decide which scenarios are considered interesting and significant and which could be abandoned. If the company notices for example that (possibly coming) political

changes in Latin America are not affecting the paper sector there, they can exclude the scenarios considering the subject.

7.4. The Strategy Process and Scenarios

A strategy process supported by scenario thinking should be an ongoing process instead of one-time decisions. This kind of continuous process, described as "*learning through experience*" or "*readjusting controllable variables in real-time*" does never finish with a single static strategic plan. Instead, the uncertainty is always present and the idea of best strategy is not applicable (Van der Heijden 1997). In this kind of strategy process, scenarios turn out to be useful tools.

Clearly, the monitoring of the focus areas of scenarios is important. That is, if the political development in Latin America provides threats or opportunities to paper consuming, a regular monitoring of political signals is needed. The scenarios also offer help in finding the signals. For example, if the scenarios suggest that China's increasing involvement in WTO can accelerate the economic development and freedom of speech in China, then the WTO-meetings should be monitored.

Last and perhaps the most important step is to include the scenarios to the strategy process of the company. This includes monitoring scenarios, making new scenarios and modifying the old ones (e.g. with the help of a scenario database of some kind), making conclusions of them and finding the essential out of them in order to support the decision-making. While it is impractical to build entirely new strategies, the real usage of scenarios would be testing the existing strategies with the scenarios, adjusting the strategies when needed.

The essence of scenarios lies in the deepened understanding inside the company. They are not meant for forecasting single events and probabilities nor comparing which snapshot of the future is the best and most probable one. As Ged Davis from Shell, the perhaps most active scenario using company in the world, has stated: "Building scenarios is about widening perspectives. Using scenarios is about widening options."

8. Case 4: One Laptop per Child

8.1. Introduction

While the growing consumption potential lies in the developing countries, especially in Asia and South-America, it is essential to understand the factors affecting the consumer behaviour there. With over 1 billion inhabitants each, India and China are the most interesting economies of the developing world. In India, for example, the economic growth has been over 6% for the last couple of years and China has met yearly growth rates of over 10%. (Grundström 2005) The total paper consumption estimates for year 2010 vary from staying stable in 43,0 million tons (2003) to raising up to 60 million tons or more (He & Barr 2004). With the economic growth, adding the pyramidal population

structure, the crucial question is: how does the behaviour of the young develop? As the answer is far from obvious, the growth of these economies offers both serious risks and opportunities. In addition the governmental activity is somewhat unstable and the economies very vulnerable. But how do the consumer behaviour patterns develop? How will the people use their (very probably) increasing buying-power? And most importantly, could we influence the consumption behaviour?

As an example, a case study of a project which most likely will have an effect on the media-behaviour of millions of people in the developing countries, is considered next. The focus of the example lies in educational aspects. After observing the project and thinking of running a similar project, some thoughts are given about alternative approaches.

8.2. The Project

One Laptop per Child (OLPC[37]) is an association that aims to provide free (charity funding) computers to children of the developing countries. The project is a good example of a global project that can have huge consequences to the media-behaviour of people of the developing countries. Next is discussed what the project is, why it has happened, what threats does it present to print-media consumption and what could a paper company learn from the project.

The OLPC association has designed in co-operation with MIT Media Laboratory a $100 laptop, which they aim to manufacture 100 million pieces for the children of the developing countries. At the moment, the project works in co-operation with the UNDP (UN Development Programme) and it is already estimated that with internal and external funding, the governments of China, India, Brazil, Argentina, Egypt, Nigeria and Thailand will buy the first 5-10 million machines by the end of 2006. As the computer is already designed, the manufacturer determined and preliminary funding collected, it is certain that the project will materialize, at least in some level of the aimed.

An obvious consequence is that the level of education is about to rise, as the pupils and teachers will have better tools. But, while the use of paper has traditionally gone up along with (among other things) the literacy rates (He & Barr 2004), it is not so obvious that it will do so also in the future, if the younger generation doesn't get accustomed to paper-based media.

8.3. Evaluating the Threats

Although the educational use of computers will probably increase the literacy in the 3rd world, it will also most likely drive the people more to digital media. It is easy to see that the children learning (mostly) by computer are also counting on digital media, when they

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[37] http://laptop.org

are seeking for information. Moreover, from the paper-industry point of view, one could also imagine that the consumption of paper products meant for writing and painting etc. will not grow alongside with the economical growth.

The new learning methods are studies actively nowadays. Some perhaps threatening thoughts are, for example, that the whole core of education should be changed from learning by heart to interactive computer-aided problem solving or that learning by computer applications, such as games, is more effective than traditional learning by reading. (Heinonen 2006) If these thoughts appear to be right, they would be a strong incentive for the governments and several associations caring about education to increase computer usage and decrease paper product usage in schools.

So, in order to get deeper knowledge about the threats of digital media usage on education, especially in developing countries, one should seek answers to following questions:

- If a person learns (mostly) computer-aided, how strong effect it has on the person's life-long reading habits? Could it (also) affect "reading for fun"?
- What are the educational (dis)advantages of using computers?
- What are the educational (dis)advantages of using books / other paper products?
- Are there synergies of using both print and digital media?

Some methods for seeking answers are provided later.

8.4.   Learning from the Project

The laptop project was founded by MIT Media Lab, but it was from the beginning strongly supported by several companies. It is obvious that in addition to the developing countries and especially the children, also many private companies benefit from the project as it increases the demand for computers. What is more, if the future consumers will get used to using computers, they will create huge demand for IT products in the future. Altogether, the consequences can be enormous. Next is identified some major reasons for the success of the project.

First, the global partners make a difference. Co-operation with governments, international associations and other companies seems to be the only way to achieve results in the global scale. Co-operation with respected non-profitable partners makes the project more credible and easier to approach for governments. It is also clear that large amount of partners decreases the risks faced by a single actor. The research capacity provided to the project by one of the top-universities in the world is also quite an advantage. It enables not only profound early stage research, but also getting reliable information as the project is in progress.

Second, it is essential that the goals and actions of the project are well justified. The OLPC web-page, for example, offers answers to questions: "Why do children in developing countries need laptops?" or "Why it is important for each child to have a

computer?" or "How will these be marketed?" It is simply not enough to manufacture 100 million computers just because they are cheap or could be useful somewhere.

Third, the goals of the project must be realistic. The OLPC project has a comprehensive plan of how to manufacture cheap laptops, how to fund the manufacturing and how to distribute them. It is vitally important that the goals of the project are feasible and the noble ideas also practical, that is: technically, economically and also ethically possible.

8.5.   How Could the Paper Sector Response?

First of all, one should consider whether the educational issues and the growth of digital media schools threats the futures paper consumption or not. A useful starting point could be contacting one of the many media education research groups of the world, for example UNESCO Chair in Global e-Learning in University of Tampere. The primary goal of the study could be for example *the consequences of increasing usage of the digital-media in education*. An interesting subject of study would also be *the learning synergies of printed- and digital-media*. That is, in addition to get to know the threat-scenarios, it would be advantageous to know the positive effects of learning with paper-media in comparison with the digital-media and these two combined. It is by far not clear that computer beats paper in every branch of education. The results could also be quite general and applicable to both western and developing societies and therefore useful when estimating the global paper consumption.

The research results are essential as grounds of marketing later on, if actions are taken in order to increase the paper product use in schools. After deciding that the educational aspect is significant and provides a considerable threat (or opportunity) to paper consumption, one should act in order to restrain (or accelerate) the development. Here a project similar to OLPC could be successful.

8.6.   A Global Project

As the OLPC aims to increase the learning possibilities of the poor children, similar project driven by paper-industry would have the exactly same goal. Learning tools made of paper have a lot of beneficial features like cheapness, simplicity of use, life time or environmental friendliness (compared to a laptop). The operating plan of the project could be, in a nutshell: *providing free paper-made learning tools to children of developing countries.*

The partnership network could consist of other paper companies, publishers and donators. As the partner network should have common interests, the whole of paper branch could be included. If interested, governmental actors like the Finnish government could allocate its development funding to the project. Other useful non-profitable partners would be the Finnish Service Centre for Development Cooperation (KEPA) or Institute of Development Studies in Helsinki University.

Quite a utopian idea would be to participate the OLPC, as the "learning by computer" could be expanded to a whole "learning package" consisting, in addition to laptops, books, perhaps a printer and printing paper. As absurd the idea might feel, one has to remember that to an unusual problem there might be quite unusual solutions.

8.7.   Alternative Approaches

Both China and India have turned more and more open to foreign investors in general. Especially in China, foreign investments are received with great joy and publicity. This, however, differs geographically and the significance of investments for the poorer provinces is higher. (Jussila 2005) Especially in these areas, a single company can have an enormous influence to local people. Paper-related investments could offer great possibilities to affect the paper-consuming behaviour. In practice this means, that when opening new offices or production units in these areas, the local people should not be thought as purely labor force but also as consumers, whose consuming decisions can be greatly affected.

The investments do not have to be direct, also business partners in the selected area can be utilized. Concrete examples could be almost everything from paper factories and delivery centers to publishers, print houses or editorial activities. While these kinds of investments cannot be made purely in order to increase the paper consumption, the idea would be to get involved with the existing or coming investments. That is, a paper factory could offer free paper for local news-paper publishing, a delivery center could offer free book logistics to schools or a sales partner could sell paper discounted for educational purposes. There are a great deal possibilities of which many are relatively cheap and perhaps still effective.

As a conclusion and recommendation, the consumer behaviour should be taken into account in every branch of business activities in the developing countries. First, it should be made clear what the real advantages of using paper in education are. In addition to fostering favorable consuming preferences, increasing learning conditions in poor countries would have many positive side-effects (to e.g. company image). Second, it is difficult to say which is more effective, a global-scale attempt to increase paper use in education or local projects having the same goal. The main idea is that a paper company should pay more attention to consumer habits and increase its actions that secure paper consuming in the future.

Conclusions on the Cases

The conclusions directly related to each case are presented in separate sections after the particular case and they are not repeated here. As already suggested in the introduction to the cases, the main conclusion is that *different foresight methods can and should be combined in order to achieve a holistic view of the subject*. As we obviously cannot build a theory of everything, we should try to use the methods so that they complete each other in a natural way.

Also the cases can be linked together by utilizing the outputs of one process as inputs for some other process. For example, the performance of different media platforms can be used in the method described in case 1 to estimate the use intensity of particular product in cohorts. On the other hand the scenario approach can be used to plot possible development paths and the most interesting ones can be elaborated with forecasts produced by the process described in case 1. In other words, different methods are appropriate to different phases of foresight process.

The cases can be divided in macro- and micro-level approaches. The cases 3 and 4 cover macro-level issues such as general policy, environmental factors and education issues, whereas case 2 approaches the media behavior and product problem at micro-level and case 1 approaches paper demand scenarios from micro-level determinants. The different levels also support and complete each other. For example, we can test the feasibility of a macro-level scenario by breaking it down to micro-level, which helps us to obtain more reliable results.

The differences and similarities of the cases can be classified with the help of dimensions presented in section 3.3. In Figure 24 the cases are plotted on two dimensions to illustrate how they differ from these perspectives. For example, case 1 is clearly the most quantitative one, as it uses mainly quantitative information to produce quantitative output (paper demand scenarios). Case 2 is somewhat semi-quantitative, as it utilizes largely qualitative information (e.g. expert opinion and consumer preferences), but the analysis itself is conducted using and the output is quantitative numbers.
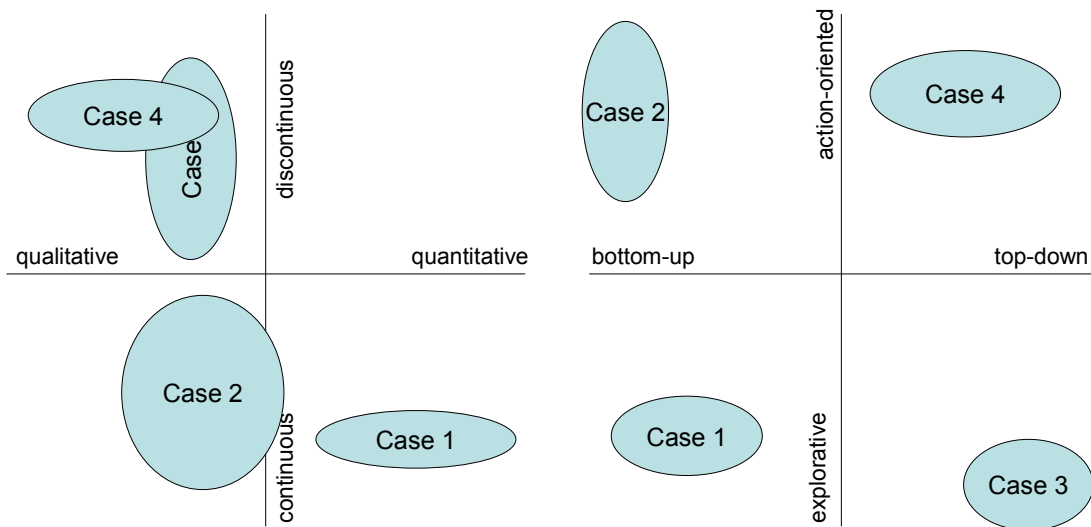

Figure 24 Classification of the cases on different dimension

The cases demonstrated some possible ways how different foresight methods can be applied to consumer media behavior and paper consuming issues. With the presented approaches we can try to find answers to crucial questions like "How will the substitution to digital media change paper consumption?", "What will the preferred media platform in the future?" or "How can we actively influence the consumers attitude to printed media?". We therefore suggest that similar processes would be very supporting and useful in the long-term strategic decision making process.

9.   Summary and Conclusions

In the study, foresight methods and tools are discussed as means of anticipating and influencing printed papers consumption due to consumer media use. In contrast to prevailing approaches in the application area, printed papers and electronic media, especially novel digital media, are considered as equal platforms for building media products. Furthermore, effort is made to identify relevant factors affecting consumer media usage in order to explore the problem boundaries for novel insights. Eventually we suggest tools for anticipating and promoting the use of paper in respect of the media platform -approach.

In part I we have outlined a framework for business foresight. Chapter 2 discusses typical foresight methods and their use, and benchmarks the foresight tools in view of several dimensions. In chapter 3 we introduce a framework to approach future paper demand from different perspectives and employ this framework in exploring consumer media use. Chapter 4 summarizes some earlier research conducted on paper demand.

In part II, we have described four hypothetical cases for anticipating and promoting future paper demand in media products, and covered the aforementioned methodological and factorial dimensions in view of these processes. In case 1, a scenario based forecasting model, stressing on demographical characteristics of media use, is suggested. In case 2, a framework is represented, where future media products can be assessed in view of different kind of consumer need factors. In case 3, scenarios are used in identifying relevant factors affecting media usage and case 4 discusses the project One Laptop per Child, where educational tools are considered as an influential factor contributing to future paper consumption.

In the study two major challenges about modeling the futures of media have come up. On one hand, we need methods that model the media sector as a whole so that all the relevant relations and feedbacks between different parts of the system can be observed. On the other hand, the factors having influence on the media sector in the future, may be observable at present only on some levels of the system, and when considering the media environment as a whole, they may not be observable. Therefore the different levels of the system should be analyzed separately, as we have done in the presented cases.

We have approached this challenge by modeling the futures of media in view of methodological and factorial dimensions. The advantage of choosing the perspective (for example long time scale, policy factors, discontinuous changes), is that we can both consider the whole system in view of the chosen perspective and identify factors that are

observable only in the local context. On the other hand, to get a proper view of the whole system, we need several methods and processes to cover all the essential dimensions. Moreover, these processes should be comparable in order to able to scale the impacts of the identified factors on the whole system.

As a conclusion, we get four recommendations:

i) Printed paper consumption is suggested to be modeled as a part of the whole media sector, where linkages between paper products and other media products could be perceived.

ii) Futures modeling and foresight processes should be conducted in collaboration with other stakeholders in the media sector.

iii) Modeling of the media sector and printed paper consumption should be based on sub-models, where essential characteristics influencing the printed paper consumption could be perceived.

iv) When using sub-models, processes should be designed compatible in order to assess the identified factors and able to scale the impacts of the identified factors in view of the business environment at whole.

Naturally there are also other approaches to the problem and the methods and the business environment can be seen from several perspectives. We think that the main idea of this work, dividing the considered business environment into sub-models by classifying the environment and the methods into dimensions is good. However, considering the actual classification represented in this work, the definitions of dimensions should be re-considered and specified before taking the model into the strategy work. Moreover, the dimensions should also be considered in view of the compatibility of the results. On the other hand, to do that properly, we should have experiences and knowledge of the real life processes carried out in this framework and carrying out some pilot projects might be useful way to proceed. Thus, we might also get information of which factors have a significant influence on media use, and which are less important. However, this study is just a starting point and the identified factors affecting the media behaviour are not more than good guesses.

References

Ajzen, I., (1988). *Attitudes, Personality, and Behavior.* Chicago: The Dorsey Press.

Ansoff, I., H. (1975). *Managing Strategic Surprise by Response to Weak Signals.* California Management Review, Vol. 17, Winter 1975.

Bass, F.M, (1969). *A new product growth model for consumer durables.* Management Science, vol. 15, pp. 215-227, 1969.

Chopra, V. & C. Szeto (Pitney Bowes) (2005*).: The Emergence of Electronic Alternatives*, Background Paper No. 18, Universal Postal Union. http://www.upu.int/news_centre/2005/en/paper_2005-08-15_pitney-bowes18_en.pdf.

Compaine, B.M. & Gomery, D., (2000). *Who Owns the Media? Competition and Concentration in the Mass Media Industry.* 3rd edition. Lawrence Erlbaum Associates.

Cuhls, K. (2003). From *forecasting to foresight processes-new participative foresight activities in Germany*, Journal of Forecasting, 2003, Vol. 22, issue 2-3, pp. 93-111.

Davis, F., (1986). *A Technology Acceptance Model for Empirically Testing New End-User Information Systems: Theory and Results.* Doctoral dissertation, Sloan School of Management, Massachusetts Institute of Technology.

Davis, F. D. (1989). *Perceived usefulness, perceived ease of use, and user acceptance of information technology.* MIS Quarterly. Vol. 13, pp. 319–339.

Davis, F.D., R. P. Bagozzi, P. R. Warshaw, (1989). *User acceptance of computer technology: A comparison of two theoretical models.* Management Science, Vol. 35, pp. 982–1002.

Diakova, E. (Pitney Bowes) (2005*): Electronic Alternatives and Direct Mail Marketing*, Background Paper No. 7, Universal Postal Union. http://www.upu.int/news_centre/2005/en/paper_2005-07-05_pitney-bowes07_en.pdf.

Fisher, J.C. & Pry, R.H., (1971). *A simple substitution model of technological change.* Technological Forecasting and Social Change, vol. 3, pp. 75-88.

Goded, M (1993). *The scenario method, From Anticipation to Action*, A handbook of strategic Prospective, Chapter III, pp 53-78, Paris, UNESCO, 1993.

Gordon, T.J. , Glenn, J.C. (Eds.), (2003). *Futures research methodology*, Version 2.0Millennium Project of the American Council for the United Nations University, 2003 July.

Grundström, E., Lahti, V. (editors) (2005). *Intia-ilmiö ja Suomi, http*://www.sitra.fi/Julkaisut/raportti53.pdf

Harding, M.C., (2004). *Mail Demand Models*. To be published in: Electronic Substitution for Mail: Models and Results; Myth and Reality. Pitney Bowes 2005. URL: http://www.postinsight.pb.com/files/MailDemandModels11_11Final.pdf

Hayhurst, D. (2004). E-technology and future of paper demand, *Pulp & Paper*, January 2004. http://www.paperloop.com/db_area/archive/p_p_mag/2004/0001/comment.html.

He, D. & C. Barr (2004). China's pulp and paper sector: an analysis of supply-demand and medium term projections, *International Forestry Review*, Vol. 6. (3-4), 254-266. http://www.forest-

trends.org/documents/publications/
ifr%20China%27s%20pulp%20and%20paper%20sector.pdf

Heinonen, M. (editor) (2006). *Literacies in the Digital Age,* Essay collection, University of Tampere

Hetemäki, L. (2005). Informaatioteknologia ja paperimarkkinoiden muutos. Paper ja Puu - Paper and Timber Vol.87/ No.7/ 2005, 424-427.

Hetemäki, L. & S. Nilsson (editors) (2005). *Information Technology and the Forest Sector*, IUFRO World Series Vol. 18, Vienna.

Hetemäki, L. & M. Obersteiner (2001). US Newsprint Demand Forecasts to 2020. http://groups.haas.berkeley.edu/fcsuit/PDF-papers/LauriFisherPaper.pdf.

Hetemäki, L., 2005. *Information technology and trends in the paper market*. Paperi ja puu – Paper and Timber. Vol. 87, no. 7, pp. 424-425.

ITU, (2006). ICT statistics home page. URL: http://www.itu.int/ITU-D/ict/informationsharing/index.html

Jussila, M. (2005): *Kiina – investointiopas 2005*, Finnish Ministry of Trade and Industry

Kivirinta, T., T. Ali-Vehmas, T. Mutanen, T. Tuominen & M. Vuorinen (2004). Forecastin Market Demand for Mobile Broadcast Services in Finland, Final Report, Mat-2.177 – Seminar on case studies in operations research, Spring 2004, Helsinki University of Technology. http://www.sal.tkk.fi/Opinnot/Mat-2.177/projektit2004/Loppuraportti_TeliaSonera.pdf

Kuwahara, T. (2001). *Technology Foresight in Japan - The Potential and Implications of DELPHI Approach*, NISTEP, http://www.nistep.go.jp/achiev/ftx/eng/mat077e/html/mat077ee.html, visited 10.4.2006

Könnölä, T., V. Brummer & A. Salo (2005). Diversity in Foresight: Insights from the Fostering of Innovation Ideas, manuscript, http://www.sal.hut.fi/Publications/pdf-files/mkon05c.pdf .

Lehtinen H. (2006). Construction of demand scenarios in paper industry. Master's thesis, Systems Analysis Laboratory, Helsinki University of Technology. http://www.sal.hut.fi/Publications/pdf-files/TLEH06.pdf .

Leskijärvi, O., A. Räisänen, M. Siponen & P. Vasara (Jaakko Pöyry) (2005). *JP Viewpoint - Identifying alternative futures for pulp and paper industry*. Know-How Wire, June 2005. http://forestindustry.poyry.com/linked/en/news/KHWireJune2005.pdf

Lehman-Wilzig, S., Cohen-Avigdor, N., 2004. *The natural life cycle of new media evolution - Inter-media struggle for survival in the internet age*. New Media & Society, Vol. 6, No. 6, pp. 707-730. December 2004.

Liebowitz, S. J. & S. E. Margolis (1998). *Network Externalities (Effects)*. http://www.utdallas.edu/%7Eliebowit/palgrave/network.html.

Liesiö, J., P. Mild & A. Salo (2005). Preference Programming for Robust Portfolio Modeling and Project Selection. Appears in *European Journal of Operational Research*.

H.A. Linstone, M. Turoff, (eds.) (2002). *The Delphi Method: Techniques and Applications,* Available at: http://www.is.njit.edu/pubs/delphibook/index.html.

Mahajan, V., Muller, E., & Bass, F. (1990). *New product diffusion models in marketing: A review and directions for research*. Journal of Marketing 54: 1-26.

Martin, Ben R. (1999), *Technology Foresight an a Rapidly Globalizing Economy*, Science and Technology Policy Research, University of Sussex, http://www.unido.org/userfiles/kaufmanC/MartinPaper.pdf

Nader, F. H. & L. Jimenez (Pitney Bowes) (2005*).: Susbstituion Patterns*, Background Paper No. 5, Universal Postal Union. http://www.upu.int/news_centre/2005/en/paper_2005-04-07_pitney-bowes05_en.pdf.

Niva, M., Timonen, P. (2001). *Consumer and product-oriented environmental policy* International Journal of Consumer Studies, Volume 25 Issue 4

Nyrölä Jukka (Jaakko Pöyry) (2003). The pulp and paper in emerging markets, Capital Market Day.

Obersteiner, M. & S. Nilsson (2000). Press-imistic Futures? – Science Based Concepts and Models to Assess the Long-term Competitiveness of Paper Products in the Information Age, IIASA Interim Report, IR-00-059.

OECD, (2006). ICT statistics portal. URL: http://www.oecd.org/topicstatsportal/0,2647,en_2825_495656_1_1_1_1_1,00.html

Petrazzini, B., Kibat, M., (1999). *The Internet in developing countries*. Communications of the ACM. Vol. 42, no.6, pp 31-36.

Porter, A., (2005). *Tech Mining. Competitive Intelligence Magazine*, Vol. 8. No. 1. January-February 2005. URL: http://www.searchtech.com/articles/full/CI%20Jan-Feb%2005%20Porter.pdf

Porter, A. & Cunningham, S., (2005). *Tech Mining* .Wiley.

Pringle, S.L. (1954). *An econometric analysis of the demand for newsprint in the United States*, Ph.D. Dissertation

Rogers, E.M., (1995). *Diffusion of Innovations*, 4th edition. New York: The Free Press.

Rouvinen, P.(2004). *Diffusion of Mobile Telephony: Are Developing Countries Different?* UNU-WIDER, Research Paper No. 2004/13, http://www.wider.unu.edu/publications/publications.htm

Sabelström, Kristina (1999). *Implementation of Information Types in Printed and Electronic Newspapers*, by. Presented at taga's 51st Annual Technical Conference, May 1999,Vancouver, Canada. Published in taga 1999 Proceedings, taga Office, Rochester, New York, usa, pp. 119–134. (http://www.nada.kth.se/utbildning/forsk.utb/avhandlingar/dokt/010504sabelstrom.pdf)

Salmenkaita, J.-P. (2004). *On Foresight Processes and Performance of Innovation Network*, Doctoral Thesis, Systems Analysis Laboratory, Helsinki University of Technology. (located at http://www.sal.hut.fi/Thesis/pdf-files/.)

Salo, A. and Hämäläinen, R. P. (1995). *Preference programming through approximate ratio comparisons*, European Journal of Operational Research, Vol. 82, Issue 3, 1995, pp. 458-475.

Siivonen, T, Lindqvist, U, Södergård. U. (2003). *Innovaatioita metsästämässä – media valinkauhassa* (in Finnish), Tekes, Helsinki

Salo, A., Gustafsson, T. (2004). *Group Support System for Foresight Processe*s, International Journal of Foresight and Innovation Policy, Vol. 1, Nos. 3-4, 2004, pp. 249-269.

Salo, A., Liesiö, J. (2006). *A Case Study in Participatory Priority-Setting for a Scandinavian Research Program*, International Journal of Information Technology & Decision Making, Vol. 5, No. 1, 2006

Schwartz, P. (1991). *The Art of the Long View: Planning for the Future in an Uncertain World*. New York, Doubleday, 1991.

Slotte, S. (2006). *Systems sensitive dialogue intervention*, Systems Research and Behavioral Science (In press)

Szeto, C. (Pitney Bowes) (2005*).: The Impact of Age, Generation and Life Stage on Use of Mail and Media*, Background Paper No. 11, Universal Postal Union. http://www.upu.int/news_centre/2005/en/paper_2005-07-13_pitney-bowes11_en.pdf.

Szeto, C. & L. Jimenez (Pitney Bowes) (2005*).: Consumer Preferences for Communications Media*, Background Paper No. 4, Version 1, Universal Postal Union. http://www.upu.int/news_centre/2005/en/paper_2005-04-07_pitney-bowes04_en.pdf.

Teichert, T. and Mittermayer, M-A, (2002). *Text mining for technology monitoring*. Proceedings of the IEEE IEMC 2002, pp. 596-601.

TFAMWG, (2004). Technology Futures Analysis Methods Working Group. *Technology futures analysis: Toward integration of the field and new methods*, Technological Forecasting & Social Change 71, pp. 287–303.

Van der Heijden, K. (1997). *Scenarios, Strategies and the Strategy Process,* Nijenronde University Press

Vanston, L.K. & Hodges R.L., (2004). *Technology forecasting for telecommunications.* Telektronikk 4.2004. http://www.tfi.com/pubs/w/pdf/telektronikk_peer.pdf.