Quality space of the magazine – A methodological approach to customer requirements as a driver of product development

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Abstract
The objective of the study was to develop a method, which enables taking customer requirements, needs and expectations into account in the paper development process. The feasibility of the method was evaluated with a case study. The target of the case study was to clarify, what kind of requirements and needs are set for magazine quality in the value network of Finnish magazines, and the role of paper in fulfilling those requirements and needs.

The method developed in order to collect and analyze customer data is called *requirement analysis*. The requirement analysis a four-step process, where i) the value network of a specified end product is identified, ii) data of the critical quality factors is collected throughout the value network, iii) correlations between quality factors and paper characteristics are defined, and iv) paper properties that contribute to the competitive advantage are identified. The requirement analysis is an application of existing methods, such as methods used in interview studies, Quality Function Deployment (QFD), and Kano's theory on attractive quality. In a paper development process, the requirement analysis takes place in the initial stage, and thus, its results can be utilized as basic data in the following steps.

Paper production is a part of the value network of a print product. In the magazine business, the direct clients for the paper industry are printing houses. However, the other actors in the value network of a magazine, i.e. publishers and advertisers, have a significant role in defining the magazine quality, and hence, the needs, requirements and expectations concerning paper quality. The definition of magazine quality and quality expectations differ in the value network. The requirements concerning paper quality vary as well. The closer the reader, the more important is the role of the target group and the editorial content. The paper is evaluated through sensory properties, such as appearance, feel, sound, and even scent. When the parts of the value network closer to the magazine production are considered, quality expectations concentrate on the issues affecting magazine production efficiency. The technical functionality of paper and its properties in carrying information are emphasized, but also the appearance and impressions affect the overall quality experience. It is more challenging to identify the correlations between quality expectations and paper characteristics when the customer asked is closer to the reader, and thus, further from the paper producer. When the total quality of paper is divided into physical properties, service and symbolic properties, the correlations are easier to detect.

The results indicate that by using requirement analysis, the requirements and expectations of print product quality can be identified throughout the value network of a product. The requirement analysis also offers tools for linking customer requirements with paper characteristics, and thus, enables observation of the customer viewpoint in paper development.

Keywords   customer, paper properties, periodical, product development, quality, value network

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Tiivistelmä

Työn tavoitteena oli kehittää menetelmä asiakkaiden tarpeiden, vaatimusten ja odotuksien huomioonottamiseksi paperin tuotekehitysprosessissa. Menetelmän toimivuutta testattiin case-tutkimuksen avulla. Case-tutkimuksen tavoitteena oli selvittää, millaisia tarpeita ja vaatimuksia suomalaisen aikakauslehden arvoverkossa asetetaan lopputuotteen laadulle ja mikä on paperin rooli näiden odotusten täyttämisessä.

Asiakastarpeiden keräämiseen ja analysointiin kehitetty menetelmä eli tarveanalyysi on nelivaiheinen prosessi, jossa tunnistetaan kiinnostuksen kohteena olevan tuotteen arvoverkko ja sen toimijat, kerätään arvoverkon toimijoilta tietoa tuotteen kriittisistä laatutekijöistä, määritetään lopputuotteen kriittisten laatutekijöiden riippuvuus paperin ominaisuuksista, ja tunnistetaan ne paperin ominaisuudet, joita kehittämällä saavutetaan kilpailuetua. Tarveanalyysissä on yhdistetty olemassa olevia menetelmiä, kuten haastattelututkimusmenetelmä, Quality Function Deployment (QFD)-menetelmä ja Kanon houkuttelevan laadun teoria. Tarveanalyysi sijoittuu paperin tuotekehitysprosessin alkuun ja sen tuloksia voidaan käyttää tuotekehitysprosessin seuraavan vaiheen lähtötietoina.

Paperin valmistus on osa painotuotteiden arvoverkkoa. Aikakauslehtiliiketoiminnassa paperiteollisuuden suora asiakas on painotalo, mutta arvoverkon muilla toimijoilla eli kustantajilla ja mainostajilla on merkittävä rooli aikakauslehden laadun määrittelyssä ja siten myös tarpeita, vaatimuksia ja odotuksia paperin laatuun liittyvissä asioissa. Aikakauslehden laadun määrittely ja laatuvaatimukset ovat erilaisia aikakauslehden arvoverkon eri osissa. Samoin paperin laatuun liittyvät vaatimukset, tarpeet ja odotukset vaihtelevat. Mitä lähempänä ollaan lukijaa, sitä tärkeämmässä asemassa ovat kohderyhmään ja toimitukselliseen sisältöön liittyvät asiat. Paperia arvioidaan sen aistittavien ominaisuuksien avulla, kuten ulkonäön, tuntuman, äänen ja jopa tuoksun. Kun arvoverkossa siirrytään kauemmas lukijasta aikakauslehden tuotantoon, laatuvaatimukset keskittyvät enemmän tuotannon tehokkuuteen vaikuttaviin tekijöihin. Paperin tekninen toimivuus ja informaation kantokyky korostuvat, mutta myös ulkoiset seikat ja mielikuvat vaikuttavat laadun kokemukseen. Mitä lähempänä ollaan lukijaa, ja kauempana paperin valmistuksesta, sen haastavampaa on aikakauslehden laatuun liittyvien tekijöiden linkittäminen paperin laatuun. Kun paperin kokonaislaatu jaotellaan fyysisiin ominaisuuksiin, palveluun ja symbolisiin ominaisuuksiin, on asiakasvaatimusten linkittäminen paperin ominaisuuksiin helpompaa.

Tulokset osoittavat, että tarveanalyysin avulla pystytään tunnistamaan eri asiakasryhmille merkittäviä vaatimuksia ja toiveita painotuotteen laadulle. Tarveanalyysi tarjoaa työkalun myös lopputuotteen laatuominaisuuksien tulkitsemiselle paperin ominaisuuksien näkökulmasta ja siten antaa eväät asiakastarpeen huomioimiselle paperin tuotekehitysprosessissa.

Asiasanat customer, paper properties, periodical, product development, quality, value network

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AUTHOR'S CONTRIBUTION

Planning and conducting all interviews in the publishing and printing sectors, conducting some of the interviews in the advertising sector. Planning and conducting the Kano questionnaire.

Analyzing the interviews as a member of the group of experts.

Analyzing the interviews according to the Quality Function Deployment method. Analyzing the results of the Kano questionnaire.

Manuscript preparation.

RELATED PUBLICATIONS

Aikala, M., Nieminen, S., Poropudas, L. & Seisto, A., The end user aspects in print product development. 30th Iarigai Conference, 7-10 September, 2003, Dubrovnik, Croatia, 11 p.

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PREFACE

LIST OF ABBREVIATIONS

GDP	Gross domestic product
ICT	Information and communication technology
CRM	Customer relations management
KAM	Key account management
VMI	Vendor Managed Inventory
QFD	Quality Function Deployment
ABC	Audit Bureau of Circulation
CTP	Computer to plate
FSC	Forest Stewardship Council
JDF	Job definition format

CONTENTS

1 INTRODUCTION

1.1 Development trends in the printing and paper industries

Radical changes are taking place in the paper and printing industries. This is partly due to changes in the use of media, particularly the growing use of digital media, as well as to the challenges facing production efficiency, for example, rising energy prices. These changes will affect the publishing business as well, but the digital format is an opportunity for publishers rather than a threat. For example, in Finland most magazine titles have digital versions on the Internet, and these are considered to support the printed magazines (Antikainen, 2008; Birkenshaw, 2006; Grönlund, 2003; Joss, 2006).

Printed products such as magazines and newspapers are in general very dependent on advertising, expenditure on which normally follows the trend in gross domestic product (GDP). Recent forecasts for global advertising expenditure are for slower growth in North America (3.5%) and Western Europe (3.7%), compared with growth of 11.8% in the rest of the world. One of the main criteria in the selection of advertising medium is to reach the target group, i.e. consumers' media use habits. Thus, advertising revenues are diminishing in the case of print media, but growing in the case of Internet advertising (ZenithOptimedia, 2008).

<u>Printing industry</u>

Competition in the printing industry in Western Europe is tough because the market is saturated. In the publication printing market, i.e. magazines, catalogues, newspaper supplements and other periodical inserts, the balance between gravure and heatset web offset printing processes changed from the domination of gravure to domination of web offset between 1986 and 2006 (Bjurstedt, 2007). In Finland the printing industry concentrates on the domestic market and only a few companies have invested in exporting. Printing is a mature business which generally follows the trend in GDP and in which growth is slower than in some other lines of business. Traditionally, printing houses compete with price, which, in the long run, can be harmful for the whole business. (Grönlund, 2006) However, recent studies (Koivumäki, 2005; Anon., 2006a) indicate that at least in some cases quality and reliability are more important selection criteria for the customer than price.

In Finland the driving force for growth has shifted over the past few years from capital investment to innovation. The printing industry has been and still is a very investment-intensive business, and for this reason has lagged behind other lines of business, which have been quicker to seek growth through innovation. The innovations introduced in printing have traditionally been technical, stemming not from customers' requirements but largely from, for example, the printing press manufacturer's interests. Constant development in production efficiency through increasing widths of printing presses, process automation and improvements in working procedures, the increasing complexity of the product, and the use of different kinds of inks, e.g. UV inks or highly pigmented ones, are mentioned as current trends concerning printing processes. These technology innovations have been bought by printing houses, which have not, therefore, had to

engage in their own research and development work (Antikainen, 2008; Birkenshaw, 2006; Grönlund, 2006; Koivumäki, 2005; Anon., 2007).

Today, printing houses need to be able to come up with their own innovations. It has been noticed that already 30% of the printing industry's income comes from somewhere else than the traditional printing process, for example, from services that give additional value to customers. The key to the survival of the printing industry is to offer the services that customers want and need (Antikainen, 2008; Grönlund, 2006; Koivumäki, 2005; Anon., 2007).

The paper industry

It is a well-known fact that newspaper consumption has been decreasing in the US since the late 1980s (Anon., 2004b; Hetemäki, 2005). The same phenomenon has been in evidence in other countries (Figure 1a) albeit a little later than in the US. There has been a similar trend in the consumption of office papers (Figure 1b). Magazine papers seem to behave a bit differently, and so far there are no clear signs of any structural break in the consumption pattern. However, Soirinsuo (2007) predicts in his thesis that magazine consumption in the US will start to decline at the beginning of 2020s at the latest. There has been over-capacity in mechanical publication paper production in Western Europe for about a decade. Thus, paper companies have been shutting down production lines and even entire mills at an increasing rate speed over the past few years (Anon., 2008b).
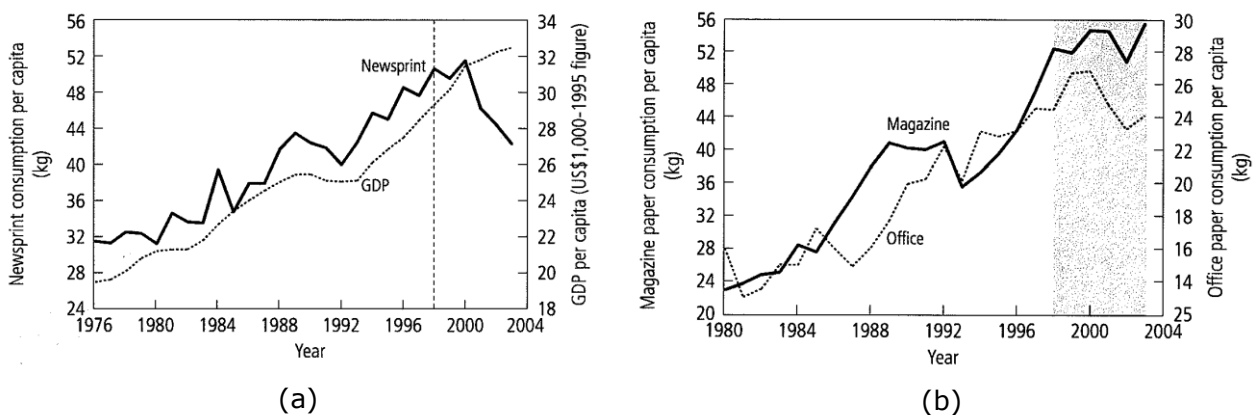
Figure 1. a) Newsprint consumption per capita and GDP per capita: Mean values for Australia, Canada, Denmark, Finland, Norway, and Sweden, 1976-2003. b) Office and magazine paper consumption per capita: Mean values for Canada, Denmark, Finland, France, Germany, Italy, Japan, Norway, Sweden, and the United Kingdom, 1980-2003 (Hetemäki, 2005).

One clear difference between newspapers and magazines is the effect that information and communication technology (ICT) has had on these businesses. As Figure 2 indicates, development in the ICT sector by no means had a negative effect on printing and writing paper consumption during the period 1960-2000. However, the change in newsprint consumption has been much more moderate. The structural change in newsprint consumption can be detected in the US in the late 1980's (Figure 3) and a little later in other countries (Figure 1a). There are several reasons behind the structural change, including the basis weight reduction of newsprint from 60g/m^2 to 48 g/m^2, the change

from broadsheet to tabloid format, and improvements in technical processes. However, the major reason appears to be the declining number of newspaper readers and, thus, the marked decline in newspaper circulation. The use of the Internet as a source of news and information has affected the use of traditional media including newspapers, TV and radio (Hetemäki, 2005). In the case of magazines, however, ICT has created a supply of new ICT-related magazines, while the ICT industry itself is also an important magazine advertiser (Hetemäki, 2005). Lately the traditional relationships between economic growth, population growth, paper price trends, and paper consumption has vanished in North America, Western Europe and Japan, where the role of advances in ICT cannot be neglected. No similar phenomenon has been detected in China, Russia or India, for example (Hetemäki, 2006).
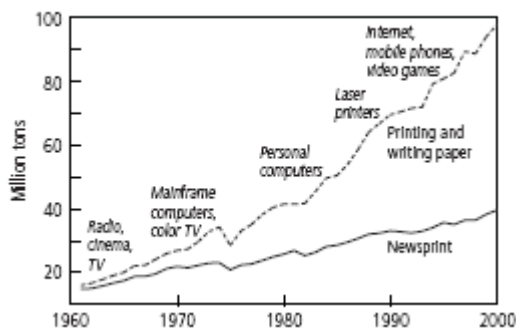
Figure 2. World communication paper consumption and ICT development, 1960-2000 (Hetemäki et al., 2005).
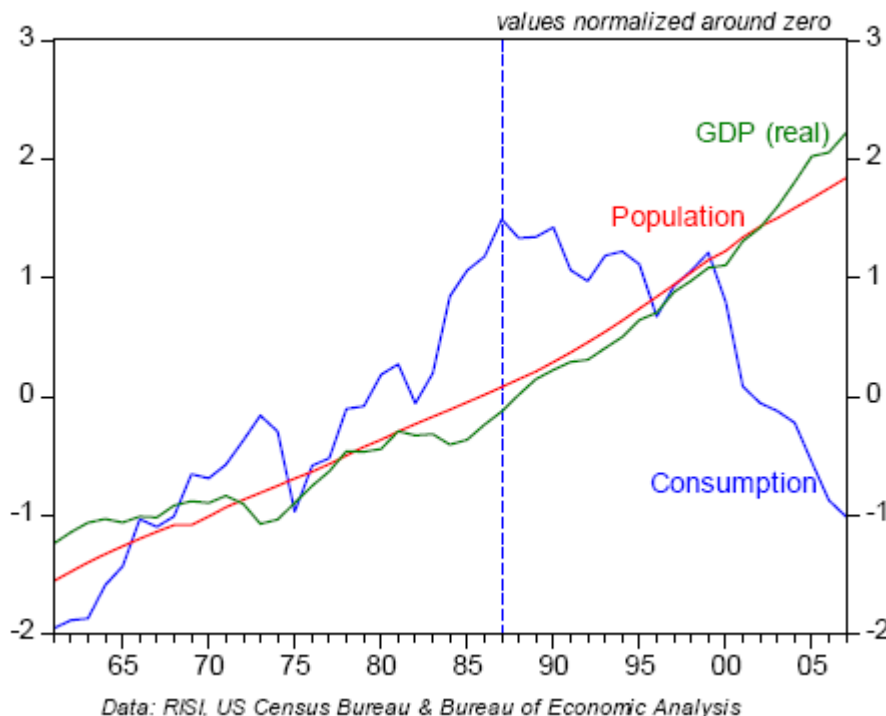
Figure 3. US newsprint consumption, population, and GDP in 1961-2007 (Hetemäki, 2008).

Current trends in the paper industry include cutting production costs and increasing the competitiveness of current products, increasing production in China, Russia and Latin America, and improving the eco-efficiency of paper production. The development of new

products has not been in the strategic focus (Hetemäki, 2006; Ilvespää, 2003). On the other hand, according to the more radical scenarios of the future, the forest industry could take a more active role in developing new products, such as biofuels, intelligent packages and hybrid media products (Hetemäki, 2006; Peltola, 2007).

Based on a report by the Finnish Forest Industries Federation and the Finnish Paper Workers' Union (Anon., 2006b) Finland's forest industry is facing challenges very similar to those encountered by the printing industry. The profitability of paper companies is weak, there is severe over-capacity in several paper grades in Europe, and paper prices are low. The report suggests that research and development in the forest cluster should be shifted towards the end of the value chain, i.e. based on the needs of consumers and advertisers.

There is an obvious need for the paper and printing industries to move their product portfolio towards the customer. Sales and marketing naturally have important roles in this, but research and development should also embrace the customer perspective.

Collaboration in paper development has long traditions in Finland; a good example is Oy Keskuslaboratorio (KCL), a research company owned by Finnish pulp and paper producers and founded in 1916. The extent and nature of this collaboration have naturally changed over the years (Lemola, 1994).

1.2 Product development in the paper industry

1.2.1 Present methodology used in paper development

The product development process has not been widely studied in the paper industry. In fact, there are only a few earlier studies concerning this area. The first attempt at this is a study from the 1970s in which the links between paper performance and its quantitative properties were defined through product analysis (Ryti, 1976; Hiltunen, 1999). The goal of product analysis is to define which measurable product properties are important to the functional behavior or use of the product. Product analysis is carried out by listing the critical functional properties of the final product, e.g. 'no print-through' and 'good runnability on the printing press' and then interpreting these properties by using measurable paper properties such as opacity and tear strength. Examples of product analysis are presented in Paulapuro (1986) and Kalela (2005), where it is referred to as internal product integrity. Comparing these two studies it seems that there are attempts to shift the focus of product analysis from product-oriented to customer-oriented work. Jokinen (1987) compared product development in Finland and in the US in the late 1980s and found differences in them. Chronéer (1999 and 2005) on the other hand, studied changes in product development in the Swedish process industry between the late 1990s and early 2000s. The paper industry was included as one business area in her research.

Traditionally, product development in the paper industry has been more like product improvement than the development of new products. It has focused on the production process, and companies have relied on their own resources and skills to improve their

existing products at competitive prices (Jokinen, 1987; Chronéer, 1999; Pajari, 2004). The life cycle of a paper product is very long, and product improvement is necessary to maintain competitiveness. The other major task of research organizations in the paper industry has been to solve problems in production. The product development strategy in Finland has often been in line with the company's strategy, which means that product innovations have been based on the company's strategy. Thus, this kind of product development strategy does not support radical innovations. The alternative, autonomic development strategy, expects the product development organization to come up with completely new solutions. This strategy has been more popular in the US since the 1980s, and indications of its use in Finland have been given lately (Jokinen, 1987; Chronéer, 1999).

As recently as the late 1980s it was considered that product development should be more market-driven. The reason behind most of the unsuccessful product development projects has been the gap between product properties and the needs and expectations of the market. Despite this, there has been little interaction between the marketing and development departments within paper companies (Jokinen, 1987). In the late 1990s, product development teams started to feature members from different company functions, namely development, marketing and production. However, the different functions were active in different phases of the product development process, for example marketing was most active at the end of the process (Chronéer, 1999). According to Song (1996), successful collaboration between different company functions requires i) a high-quality cross-functional relationship, which means for example patterned collaboration between team members, rotation of qualified persons, and conflict-solving by team members themselves, ii) no lack of credibility throughout the project, and iii) rewards for collaboration and cooperation. There have been applications in which collaboration between a company's different functions has been planned beforehand. For example, Sommerhäuser (2005) has applied a Development Pipeline Model, in which the first step was to identify responsibilities in the different project phases. This model has been successfully used in office paper development.

The importance of creating links to customers was noted in the 1990s (Jallinoja, 1990; Chronéer, 1999). There has been a desire to collect information on customers and to use it in product development projects. However, the exchange of information between product development teams and their customers has generally been informal. In reality, product development team members have adopted a customer-oriented view during projects, although their working procedures have still been very traditional. Chronéer has suggested that process industries should find suitable ways of structuring their information gathering and sharing. Successful product development requires continuous and frequent use of customer concepts in order to be familiar with market aspects and customers' way of perceiving and understanding the product and its problems (Chronéer, 1999).

1.2.2 Product development in the supply chain

Supply chain concepts have been prominent for several years in many manufacturing industries; in the paper industry, however, it is not until recently that more attention has

been given to supply chain issues. There are two main reasons why the industry has been slow to adopt supply chain concepts. Most other manufacturing industries have for the past twenty to thirty years had to contend with the effects of global competition, market consolidation, excess capacity, price weakness and new technologies, and this has forced them to focus on supply chain issues. It is only recently that the paper industry has started to face similar challenges. Another reason is that the paper industry differs in certain important respects from other types of manufacturing; these include low product standardization, many and varied product end-uses, a supply chain focused on capacity management, and the fact that quality management is relative and scheduling is based on multiple orders, which makes it difficult to adapt existing knowledge of supply chain concepts to the paper industry (Lail, 2003).

According to studies by Lail (2003) and Hagy (2000) the goals and objectives within the supply chain are i) to provide superior customer service, ii) to improve product quality, iii) to reduce the cost of purchased materials, iv) to reduce manufacturing costs, v) to reduce inventory levels and holding costs, and vi) to reduce distribution costs. The first step is naturally the complete understanding of all components in the supply chain. Supply chain management is a concept that can organize a mill's priorities and help personnel make the right decisions. It is the process of keeping organizational, supply and customer issues in proportion so that customer needs are met.

Lail (2003) describes supply chain best practices with the emphasis on production-related issues inside a company's organization but does not report on best practices in product development. Hagy (2000) has widened the scope of the supply chain outside the company's borders to include suppliers. Bringing the supplier and the customer closer together requires a good flow of information. Information can be considered to be a product, because the customer's need for information relating to products or services can sometimes be as important as the material or service itself. Moore and Mitrou (2002) have taken an even wider perspective by including the customer's customer and the supplier's supplier in the supply chain.

The enhancement of relationships in the supply chain could ultimately extend to complete integration with the customer base. The paper product will be just one part of the total package, which will also include the relevant services. The integration process goes beyond manufacturing into product development. The market will be subject to continuous change and there will be a need to react quickly to market redefinition. This will be achieved through complete integration with suppliers (Moore, 2000).

The goals for supplier involvement in a manufacturer's product development process can be divided into short-term and long-term ones. The main areas of short-term goals are related to developing *efficiency* and *effectiveness*. Supplier involvement can reduce development costs and lead-times, for example through early and proper communication with the supplier. Effectiveness can be increased by reducing product costs and increasing product value. Short-term goals relate to each particular development project. Long-term collaboration is much more focused on supporting the development of underlying technologies and capabilities than on designing a specific new product (Wynstra, 2001). Managing supplier involvement can pose challenges in the buyer-

supplier interface; these include a lack of communication and trust in the supplier's organization (e.g. lack of technical capabilities), and in the manufacturer's organization (e.g. no clear definition of the product development process and strategy). These topics are discussed in more detail in Wynstra (2001), Hartley (1997) and Swink (2000).

There is a lack of published research on the management of product development in the paper supply chain. Suppliers of papermaking chemicals do their own product development work in order to help the paper producer to improve efficiency and product quality (Ferguson, 2000). Halsall (2005) has published guidelines for paper producers on best practices in paper machine rebuilds. Martin (2003) has reported results of a study on the papermaking parameters that affect print quality, a study that was conducted jointly by suppliers of paper machines, fillers, papermaking chemicals, printing inks and printing presses. Studies in other industries can also be utilized in the paper industry, telecommunications (Wynstra, 2001) and the assembly industry (Hartley, 1997) as examples.

1.2.3 Taking the customer perspective into account in product development

The inclusion of customer interaction in a product development project has been found to increase the success of the product. Gruner and Homburg (2000) have analyzed the performance impact of customer interaction at different stages of a new product development process. They found that customer interaction in the early stage, i.e. idea generation and product concept development, and the late stage, i.e. prototype testing and market launch, had positive effects on the success of the new product. The type of customer involved also influenced this success. Lead users, financially attractive customers and close customers were mentioned as attractive partners. However, they also found that, in reality, interaction with customers is quite rare, especially in the early stage of the product development process. On the other hand, the results of Campbell's and Cooper's (1999) research were in conflict with those of Gruner and Homburg. Campbell and Cooper found no improvement in new product success rates in customer partnership projects compared to in-house new product development projects. Both studies were related to industrial products but Gruner and Homburg concentrated on the German machinery industry, whereas Campbell and Cooper took a wider view covering several different lines of business in Canada. These differences might explain the conflicting results.

The need to shift the focus of paper development strategy from product-orientation to customer-orientation has been reported in several sources (Perkowski, 2004; McKenna, 2003; Novotny, 2005; Moore, 2003; Hayhurst, 2002). According to Perkowski (2004), one of the main reasons for declining prices and falling demand for traditional paper products is the use of old solutions to new customer problems. The paper market is mature, which means that substitutes have begun to penetrate into the market and customer requirements are no longer met by the original products. There are also many competitive suppliers of a particular product. The focus easily shifts to who has the lowest price, and suppliers must respond by focusing on cost reductions, which leads to a further fall in prices. At this mature stage, marketing strategy should concentrate more

on product breakthroughs, integrated customer solutions, and strategic alliances than on incremental product improvements and service enhancements that were excellent strategies when the product was at the development or growth stage. The focus should be shifted from a product-based concept to a 'customer first' concept.

Hayhurst (2002) has listed points that should be taken into account when the company's strategy is shifted towards customer requirements. The first task is to segment the customer base by identifying customers according to their strategic value to the company. Service strategies and pricing are then defined according to these customer segments. The second task is to differentiate the company from its competitors, not just on pricing, but on product quality, service and delivery. However, the most important differentiator depends on the customer. One good candidate is the ease with which business can be conducted, which can include the ease of reaching the contact person, continuation of the customer relationship, and mutual understanding. Management methods such as Customer Relationship Management (CRM), Key Account Management (KAM) and Vendor Managed Inventory (VMI) can be used to implement a customer-based strategy (Liebich, 2007).

Linking customer needs and expectations with a product's properties has been identified as an important field in which feasible research methods are required. The most frequently quoted methodology is Quality Function Deployment (QFD), which has been used successfully in several lines of business, including the paper industry by Jernström (2000). Chronéer (2005) has identified a four-step system for building sustainable networks of capabilities for companies that are having difficulty competing in cost-effectiveness. The steps include i) identification of key sources of customer and supplier value, the customers' requirements concerning the product and processes (e.g. utilizing QFD), supplier capabilities concerning raw material and equipment, ii) identification of the critical internal capabilities and the required competence in product and process development, iii) identification of possible information and communication flows to both suppliers and customers, and iv) planning the network structure and building sustainable links to both suppliers and customers. Kärkkäinen et al. (2001) have gone one step further and developed a set of tools for the customer need assessment process designed to facilitate inclusion of the customer perspective in the product development process (Figure 4). The tools cover the most important phases in the industrial customer need assessment process from planning need assessment to ensuring that customer needs truly direct product development.

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STRATEGIC
PLANNING
    ┌─────────────────────────────┐
    │  Company values and business│
    │             idea            │
    └─────────────────────────────┘
    ┌─────────────────────────────┐
    │  Company objectives and     │
    │         strategies          │
    └─────────────────────────────┘
    ┌─────────────────────────────┐
    │  Product development strategies│
    └─────────────────────────────┘

CUSTOMER NEED ASSESSMENT          PRODUCT DEVELOPMENT
PROCESS                                      PROCESS

 1. Define starting situation      1. Goals of product
                                      development project

 2. Gather data about
    customer needs

 3. Structure and analyze
    customer need information

 4. Gather data about
    competitive situation

 5. Set development targets        2. Concept planning
    for the product

 6. Manage development in          3. Assessment and choice
    achieving the targets
                                   4. Technical designing and
                                      development

                                   5. Introduction to the
                                      market
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Figure 4. The links between customer need assessment, product development processes and strategic planning processes (Kärkkäinen, 2001).

Based on the fact that paper properties are usually defined using certain technical parameters and their specifications, it is very challenging to communicate to the customer how the paper differs from that of competitors. Firstly, there is an overlap in technical properties between paper grades. Secondly, different customers and different customer sectors, e.g. publishing or advertising, use different criteria to evaluate papers (Jernström, 2000; Haarla, 2003). In order to truly move from a product-oriented to a customer-oriented strategy, the customer's evaluation criteria should be linked with technical paper properties.

When the paper is selected for a specific end product, technical parameters play a minor role. The key drivers for choosing the paper grade from the customer's point of view are listed in Figure 5. The drivers depend on the customer's purchasing policy and final decision-maker, cost and supply issues (paper cost, actual price differences between competing paper grades and the supply situation), and on the end product's properties

and manufacture, i.e. intended product image and customer-perceived value vs. overall paper performance. The priorities given to the drivers vary depending on factors such as the economic situation and the customer's values (Haarla, 2000). It is thus quite evident that merely improving the technical parameters of the paper is not enough from the customer's point of view. It is necessary to know the correlations between product image and paper properties, at least.
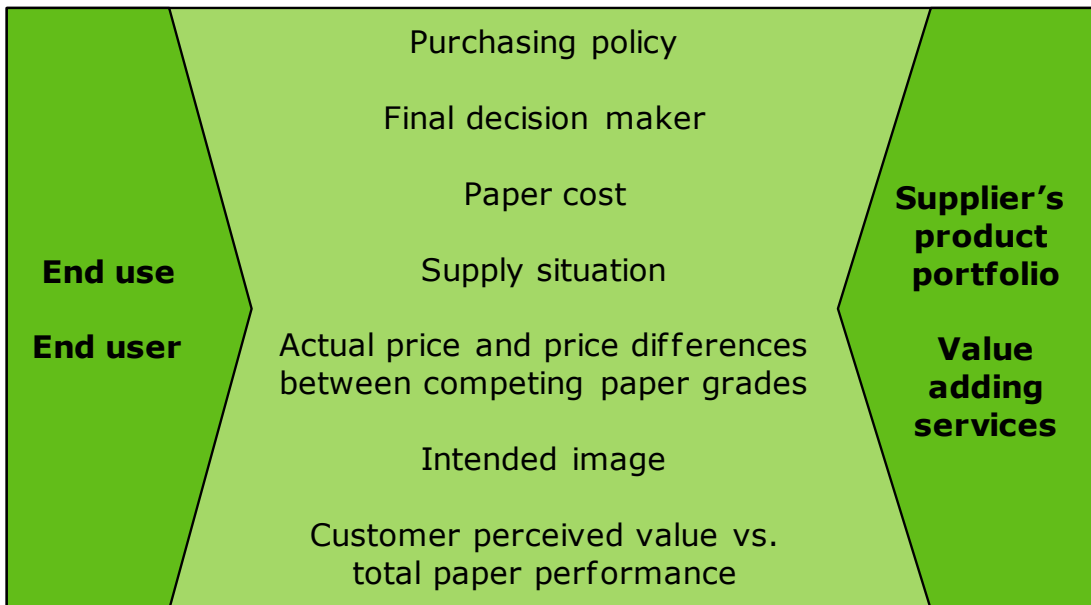
Figure 5. Factors affecting selection of paper grade for a specific end use (Haarla, 2000).

1.2.4 Summary

The need for a market-driven, or customer-driven, product development process was realized by the paper industry decades ago. However, efforts to change development strategies from product-oriented to customer-oriented have only recently intensified in response to global competition, market consolidation, overcapacity, price weakness and new technologies. Studies have been published relating to other industries and different methods have been developed and tested in practice, from which best practices can be applied and used in the paper industry.

Paper production is merely one step in a printed product's value chain: a paper mill has several suppliers, while the mill itself is a supplier to the printing house. Thus, paper development is actually only one part of product development in the supply chain. Collaboration should not be limited only to the paper mill's suppliers, instead development networks should also be built with printing houses, publishers and advertisers. Collaboration requires mutual trust and commitment, and hence the closeness of collaboration with different parties needs to be carefully considered.

A set of methods that can be used to collect data on customers' requirements and how they can be connected with technical paper properties has already been reported. However, there is no structured and validated procedure showing how these methods

should be utilized in the paper industry and how the customer's requirements could be translated into critical functional paper properties for product analysis.

1.3 Objectives of the thesis

The need to shift the paper industry's product development strategy from technology-driven towards customer-driven approach has increased recently. However, there is a need for tools for collecting and interpreting customer data in such a way that it can be used in product development. This study focuses on the product development process in the paper industry and introduces a method that can be used to develop the process towards understanding customer expectations. The first objective of this thesis is to **develop a requirement analysis method** designed to allow the customer perspective to be taken into account in the product development process.

The requirement analysis method is a systematic way to link customer expectations with paper properties by applying existing methods in a new combination and in a novel business area. It is an integral part of the current product development process in the paper industry and its results can be easily linked to the following steps in the development process. Figure 6 illustrates the linking between requirement analysis and the current steps, i.e. product and process analyses (Ryti, 1976), in the paper development process.

Requirement analysis	**Product analysis**	**Process analysis**	**Optimized product**
Customer requirements for the paper development	Customer and process requirements defined as measurable paper properties	Paper machine controls	
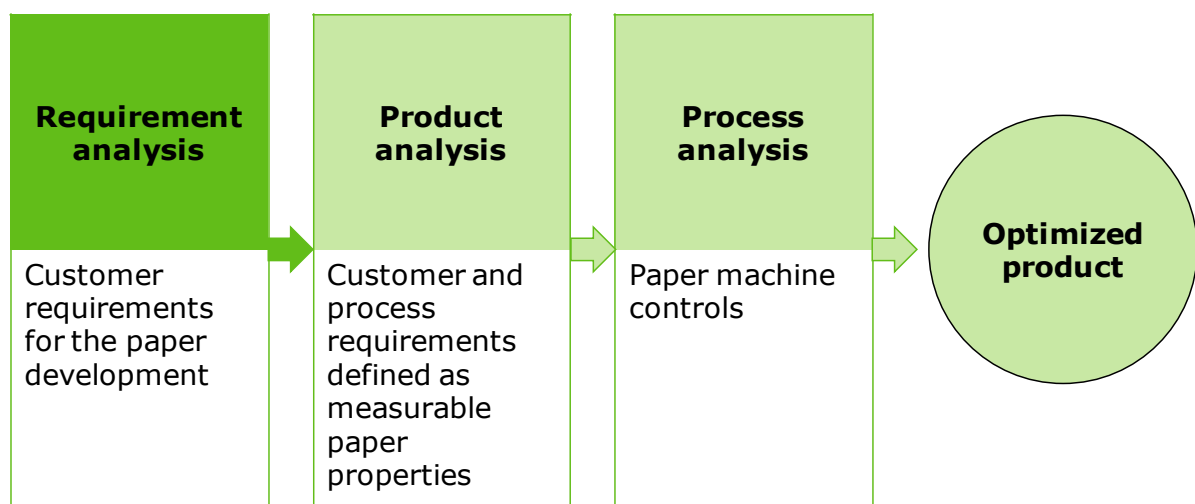
Figure 6. The new product development process in the paper industry.

The requirement analysis method is tested in a case study on magazines, and the second objective is thus to **create an example of a quality space for magazines** based on the magazine's quality criteria as identified by the requirement analysis. The example of quality space covers Finnish heatset offset printed women's monthly magazines or similar based on quality expectations.

2 METHODOLOGY

2.1 Data gathering through interviews and surveys

Interviews were selected as the main method for gathering data on customer requirements because of the following benefits:
- There has been little earlier research in the area of interest, namely quality expectations in the magazine value network.
- The directions of the discussion were not known beforehand, for example, a questionnaire would not reveal new aspects on quality expectations.
- The use of the interviewees' own words was preferred in order to get new information.

In this research a semi-structured interviewing method, namely a focused interview, was used. 'Semi-structured' means that some, but not all, of the features in the interview were decided beforehand. In focused interviews the interviewing themes are set beforehand for all interviews, although there might be variations in the actual questions and the order in which they are posed (Hirsjärvi, 2001).

The data from the interviews was analyzed using affinity diagrams. The purpose of using an affinity diagram is to reorganize the outcome of the interviews so that relationships in the area investigated become clearer. The following steps were used in creating the affinity diagrams (Hackos, 1998):
1. Several experts read through the transcriptions of the interviews. Interesting observations and issues were highlighted.
2. Each expert was provided with a set of adhesive notes and was asked to write down one item on each note. Everyone was allowed to write as many notes as they chose.
3. The notes were stuck onto a white board and arranged by the expert team into groupings.
4. The groups were labeled.

The groups were divided into insight sheets on which specific examples of interviews that support and explain the insight were listed (Hackos, 1998).

The findings from the affinity diagrams were linked with paper properties using the Quality Function Deployment (QFD) method. The most critical paper properties from the customer's point of view were classified based on Kano's theory of attractive quality. The principles of Quality Function Deployment are presented in chapter 2.3 and of Kano's theory in chapter 2.4

2.2 Interpreting qualitative research data

A qualitative approach is useful when the area being researched is not well known beforehand or the target is to reveal new and unexpected viewpoints from the area of interest.

Analysis of qualitative data consists of two interdependent phases: simplification of the findings and solving the puzzle. *Simplification of the findings* means that the data is investigated from a certain theoretical viewpoint at a time and that the large number of individual smaller 'sub-findings' is combined into a larger metafinding. Combining the sub-findings is based on commonalities between them or on making a rule which is valid for the whole data. The starting point for combining the findings is the assumption that the data consists of examples of the same phenomenon (Alasuutari, 1995).

Solving the puzzle means that the phenomenon under study is interpreted based on the findings from the data and from the literature. The sub-findings are used in this phase to guide the interpretation. During puzzle solving new questions usually arise leading to simplification of the findings from a new viewpoint (Alasuutari, 1995).

The generalization of results in qualitative research has been considered problematic due to the small number of samples. It is often said that with quantitative research methods the results are shallow but reliable, while with qualitative research methods the information is profound but hardly general. Thus, qualitative research methods are often considered especially useful in pre-studies. Actually, simplification of the findings is a way of generalizing the results. However, it is not appropriate to calculate statistics from qualitative data if the number of samples is small. Sometimes, generalization is not a problem, for example in cases when the phenomenon studied is well known but not conscious or when the findings are similar to those of previous studies (Alasuutari, 1995; Eskola, 2003). In this study, the number of interviews was based on the amount of new information: when no new information was revealed in the interviews, it was assumed that the interviews adequately covered the expectations of that part of the value network. The generalization of the data was evaluated by comparing it to findings from the literature.

2.3 Using Quality Function Deployment (QFD) in data analysis

Quality Function Deployment (QFD) can be defined as the conversion of customers' demands into quality characteristics and development of a measurable target quality for the end product. These are achieved by systematically analyzing the relationships between the demands and the characteristics starting with the quality of each functional component and extending the deployment to the quality of each part and process. The overall quality of the product will be formed through this network of relationships (ReVelle, 1998).

QFD provides specific methods for ensuring quality throughout each stage of the product development process, starting with design. The Quality Chart (Figure 7) is the tool used to assist in converting customers' demands into corresponding quality characteristics.

The Quality Chart is a two-dimensional matrix consisting of a demanded quality chart (Customer Needs and Benefits), combined with a quality characteristics deployment chart (Technical Response). Combining the two matrices expresses the relationships between the qualities and quality characteristics in demand. The planning matrix is used to prioritize the customer's needs, the present state of the company, and the sales arguments. The technical matrix is for benchmarking the product's behavior in the market (Karjalainen, 2004; Mitsufuri, 1990; ReVelle, 1998).
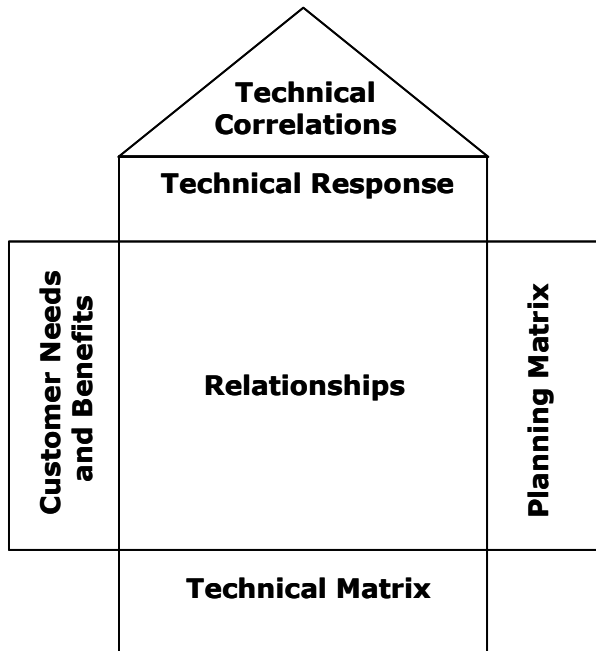
Figure 7. House of Quality (Mitsufuri, 1990).

The first task in using the QFD method is to systematically analyze the information gathered on the qualities that customers want in a product. The raw information provided by customers is converted into information that can be used in the quality chart. This information forms the part Customer Needs and Benefits in Figure 7. An example of converting the customer verbatim into more specific information is presented in Table 1 (Jernström, 2000).

Table 1. Converting customer verbatim into more detailed needs. Product: a women's magazine (Jernström, 2000).

1st level	2nd level	3rd level
Printed quality very important	Luxurious, an image of quality	High visual printed gloss
		Colors must be bright, clean and 'singing'
		White – high brightness – printing substrate
	Colors must look either natural or like original	Perfect color matching
	Print from one side should not be seen from the other side	No print-through
		No transparency
	Good sharp images	Good detail rendering

The next step is to generate a quality elements deployment chart, i.e. the part called Technical Response in Figure 7. Quality elements are design elements that can be measured when we evaluate quality. Quality characteristics are the measurable individual aspects of quality elements. When quality elements have multiple quality characteristics, a quality characteristics deployment chart may be used to illustrate these relationships. An example of a quality characteristics deployment chart is presented in Table 2 (ReVelle, 1998).

Table 2. Example of a quality characteristics deployment chart. Product: radio control system (ReVelle, 1998).

Quality elements (1st level)	Quality elements (2nd level)	Quality characteristics (3rd level)
Maneuverability	Portability	Measurement
		Shape
		Weight
Electrical function	TRS characteristics	Electrical consumption
		Electric temperature characteristics
		Operating range voltage

After forming the charts 'Customer needs and requirements' and 'Technical response', the degree of correlation between required quality and quality elements is evaluated in the Relationships matrix of Figure 7. The following correlation coefficients are used (Mitsufuri, 1990):
   ° 9 is for strong correlation,
   ° 3 is for moderate correlation and
   ° 1 is for weak correlation.

The customer's needs and requirements are ranked based on their importance to the customer. The importance of each quality characteristic is evaluated by multiplying the

degrees of correlation by the rank order of the quality demand and summing the results characteristic-wise (Mitsufuri, 1990).

QFD was initially developed to assist in the design of products and is especially useful when applied to complex products. The methodology can be very valuable in bridging the communications gap between the customer and, say, the personnel involved in manufacturing the product. The House of Quality (Figure 7) can be expanded to cover more of the design process by linking together the Houses of Quality of different parts of the design. An example is presented in Figure 8, which illustrates the Four Phase Approach (ReVelle, 1998)
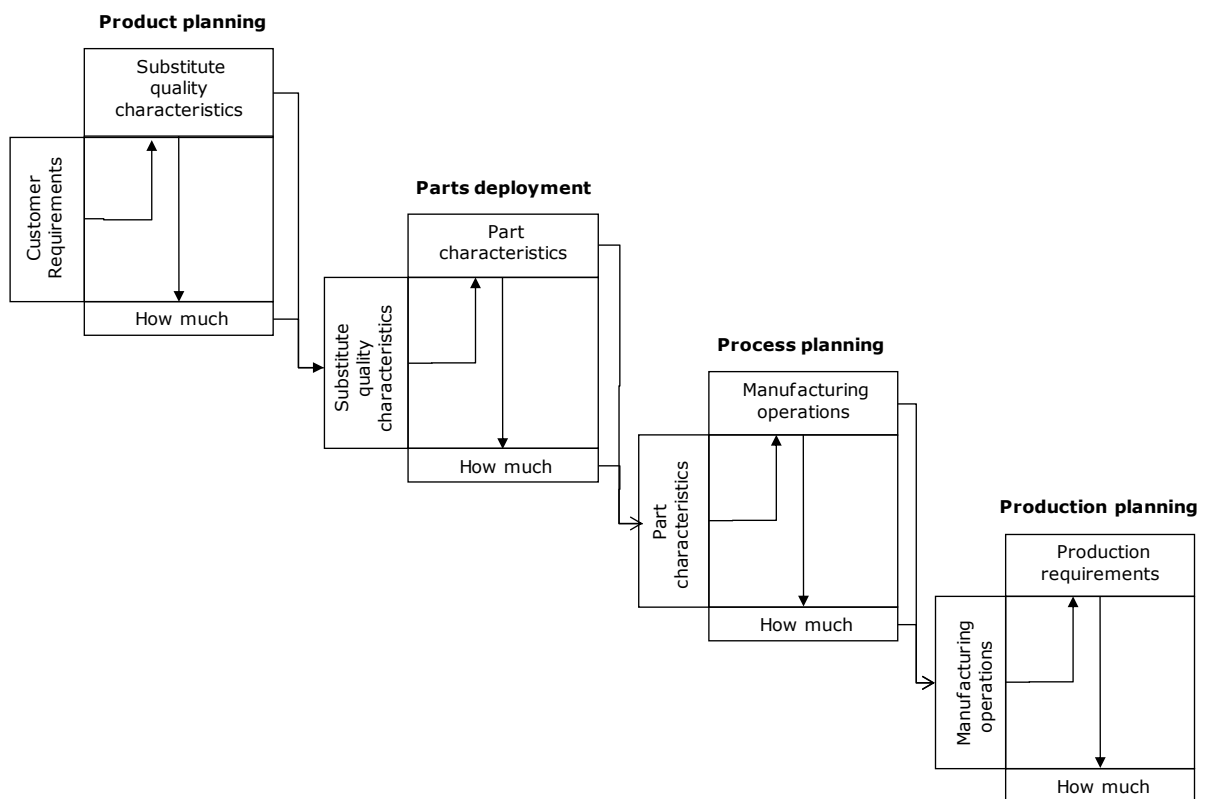
Figure 8. Four phases of QFD (ReVelle, 1998).

The QFD method is widely used in areas such as the production of piece goods and the provision of services. However, the method is not much used in the paper industry despite its benefits to the product development process in terms of reducing the duration of the process, lowering costs and enhancing the traceability of decisions (Gabl, 2004; Simons, 1991). In the paper industry QFD has been used to compare magazine papers produced by competitors (Jernström, 2000), to identify the most important parameters of release papers from the customer's point of view (Löfgren, 2001) and to assist in the development of felts for the paper machine press section (Kääpä, 2005).

The challenges encountered in applying the QFD method in the paper industry relate to features that are typical of the process industry. For example, paper properties are strongly correlated with each other. Also, paper forms a substrate for printing, and it is

sometimes difficult to make a clear distinction between the effect of the paper and the effect of the printing process.

In this work the QFD method is used to link customer requirements with paper properties. The idea of linking QFD matrices (Figure 8) is employed, but in this study the phases correspond to the different players in the product's value network, as presented in Figure 9. The last phase, in which paper characteristics are linked with paper property measurements, would be beyond the scope of this study, and therefore only the first three phases are included. In each phase, the customer's requirements for the magazine are divided into those related to the paper and those not related to the paper. The correlations between customer requirements and paper characteristics are analyzed using QFD separately in each phase, thus allowing the requirements placed on the paper in different parts of the magazine's value network to be identified.
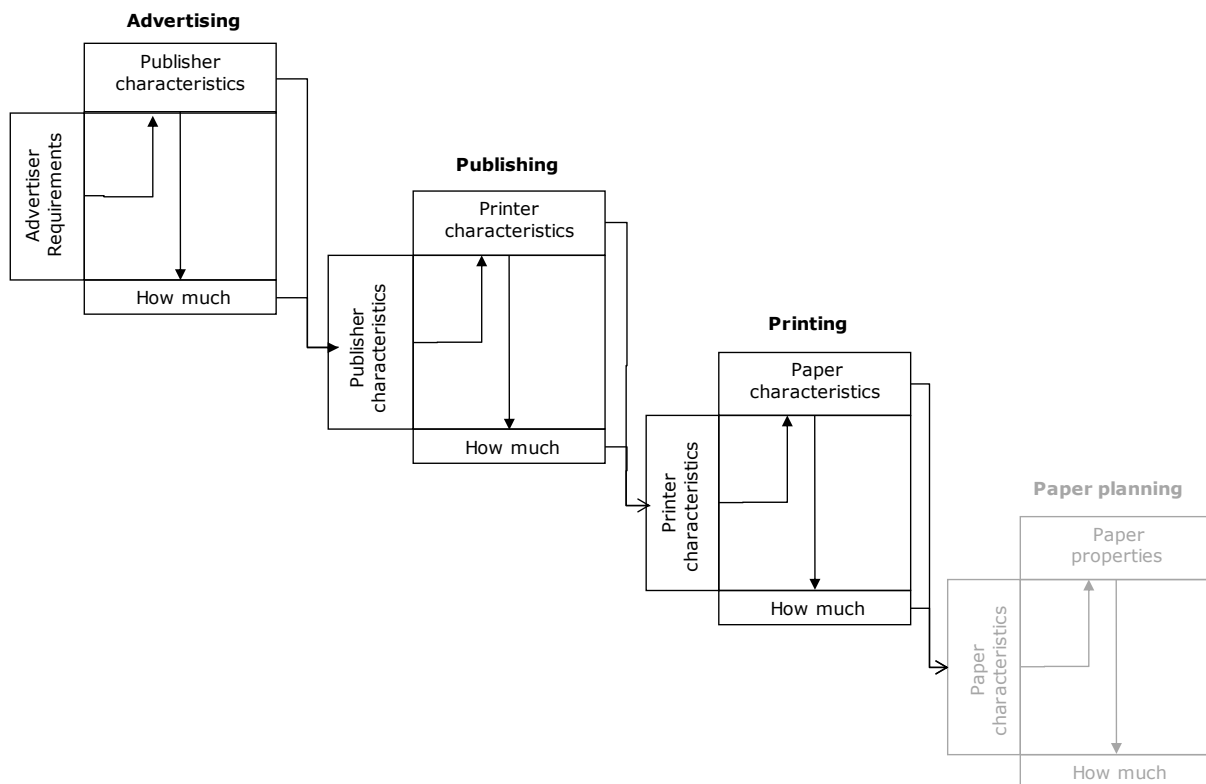
Figure 9. Four phases of QFD in the case of a magazine.

2.4 Classification of product properties using Kano's methods

Noriaki Kano from Tokyo Rika University has developed the theory of attractive quality and, based on this theory, he has developed a set of methods for investigating the characteristics of customer requirements. By using the theory of attractive quality, companies can classify quality attributes and gain a greater understanding of how customers experience their products. Figure 10 presents the basic idea of classifying product properties based on product functionality and customer satisfaction. The horizontal axis of the Kano diagram indicates the functionality of the product and the

vertical axis indicates how satisfied the customer is with the product. Customer requirements can be divided into four different categories, i.e. i) one-dimensional customer requirements, ii) must-be elements, iii) attractive elements, and iv) indifferent quality elements, as presented in Figure 10 (Kano, 1984; Berger, 1993).

For some customer requirements, the customer is more satisfied with an improvement in the functionality of the product. Such requirements are called *one-dimensional quality requirements* (Figure 10) and they relate simply to how functional the product is. In the case of some other customer requirements, customer satisfaction is not as clearly related to the product's functionality. These requirements can be labeled, as in Figure 10, as *must-be* and *attractive requirements.* The *must-be* category includes the features of the product which make the customer more dissatisfied when the product is less functional, but where the customer's satisfaction never rises above the neutral no matter how functional the product becomes. The *attractive* curve indicates areas in which the customer is more satisfied when the product is more functional but is not dissatisfied when the product is less functional. The customer may also be *indifferent* to a quality element. Indifferent quality elements would be plotted along the horizontal axis in the Kano diagram.
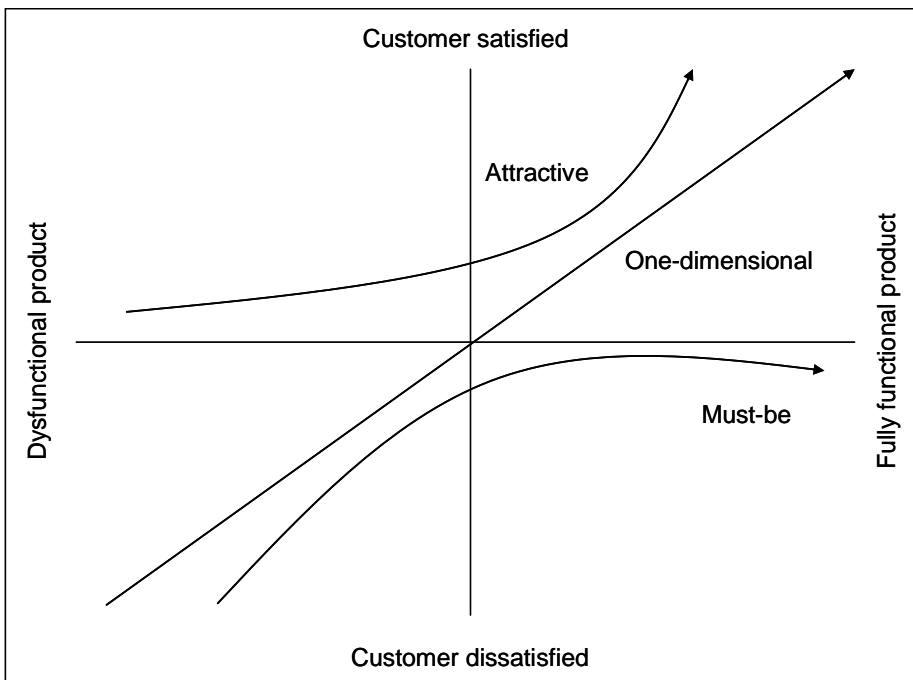
Figure 10. Kano diagram (Berger, 1993).

In their survey of packaging Löfgren and Witell (2005) categorized the properties of packages based on Kano's theory. The results of their questionnaire showed that most of a package's properties that were of interest belong to the category *one-dimensional quality*. These properties belong to the ergonomic entity of a package, for example the package is functional and easy to use. Several properties were perceived as *must-be*, for example protection leakage, declaration of contents, instructions and open dating. *Attractive quality* attributes were resealability, recyclable material and containing just the right quantity. Only one attribute, nice-looking print, was considered as *indifferent*.

Customer data is gathered using a questionnaire, in which each question has two parts: the functional form of the question, i.e. how do you feel if that feature is present in the product, and the dysfunctional form of the question, i.e. how do you feel if that feature is not present in the product. The customer selects the appropriate answer from five alternatives to both parts of the question. The five alternatives are

- I like it that way.
- It must be that way.
- I am neutral.
- I can live with it that way.
- I dislike it that way. (Berger, 1993)

Based on the responses to the two parts of the question, the product feature can be classified into one of the following categories:

1. Attractive (A)
2. Must-be (M)
3. One-dimensional (O)
4. Indifferent (I)
5. Reverse (R)
6. Questionable (Q) (Berger, 1993)

The first four categories are the same as in the Kano diagram. When the customer's answers are opposite to the initial judgment of the functional and dysfunctional parts of the question, that feature is *Reverse*. When there is a contradiction in the customer's answers to the question, the result is *Questionable*. The product's features are classified using a Kano Evaluation Table (Table 3). The answers to the functional and dysfunctional parts of the question are placed in the cross-correlation table (Kano Evaluation Table). The classification of the product's feature depends on its location in the Kano Evaluation Table (Table 3) (Berger, 1993).

The dominant customer view for each customer requirement is simply defined by calculating the number of hits in each category. If two or more categories are tied or close to tied, it is an indication that more information is needed. Not all customer requirements are the same. Kano's method gives an idea of which customer requirements fall into which quality category and thus helps to point product development in the right direction (Berger, 1993).

Table 3. Kano Evaluation Table (Berger, 1993).

Customer requirements		Dysfunctional				
		1. like	2. must-be	3. neutral	4. live with	5. dislike
Functional	1. like	Q	A	A	A	O
	2. must-be	R	I	I	I	M
	3. neutral	R	I	I	I	M
	4. live with	R	I	I	I	M
	5. dislike	R	R	R	R	Q

Customer requirements are:

A: Attractive   O: One dimensional

M: Must-be   Q: Questionable result

R: Reverse   I: Indifferent

Product features tend to have a life cycle during which they move from one category to another. A typical case of the life cycle of a quality element is indifferent quality → attractive quality → one-dimensional quality → must-be quality. The life cycle can be explained by the fact that users get used to a certain feature. At the outset, users are aware of the new feature but need some time to understand its significance (indifferent quality). When the users have used the product and are pleased with it, they recommend it to their friends and the number of users increases. People feel satisfied with the product but they are neutral even if the product does not have that particular feature (attractive quality). Later on people know the value of the feature and they will be dissatisfied if the product lacks that feature (one-dimensional quality). Finally, as time goes by, users evaluate the existence of that particular feature as must-be and they feel dissatisfied without it (must-be quality) (Kano, 2001). An example of the life cycle is the camera in a mobile phone. Only a few years ago, a camera in a mobile phone was indifferent or attractive to most users. Nowadays, the camera is a one-dimensional or even must-be property when a new mobile phone is acquired.

Kano's method has been applied in different areas of production and services. Löfgren and Witell (2005) have utilized it in packaging, Sauerwein et al. (1996) in the ski industry and Matzler et al. (2004) in the automotive industry. The Kano model has also been used to evaluate media products and services (Jacobs, 1999), as well as in the design of web sites (von Dran, 1999). However, no examples from the paper industry have been reported.

In this research, the Kano method has been used to classify customer expectations concerning the paper-related features of a magazine. The classification supplements the QFD analysis.

2.5 Physical product, service aspect and symbolic aspect define product image

Iltanen (2000) has presented three strongly dependent aspects that identify the product: i) physical aspect, ii) service aspect and iii) symbolic aspect. *Physical aspect* includes the physical product itself, its functional properties and features that are valued by the customer. *Service aspect* includes customer service, the availability of the product, and

technical support. *Symbolic aspect* means the overall image of the product including the product and the company. This latter also includes images of the price, quality, service and brand. Figure 11 illustrates how the different aspects affect the formation of the product image.
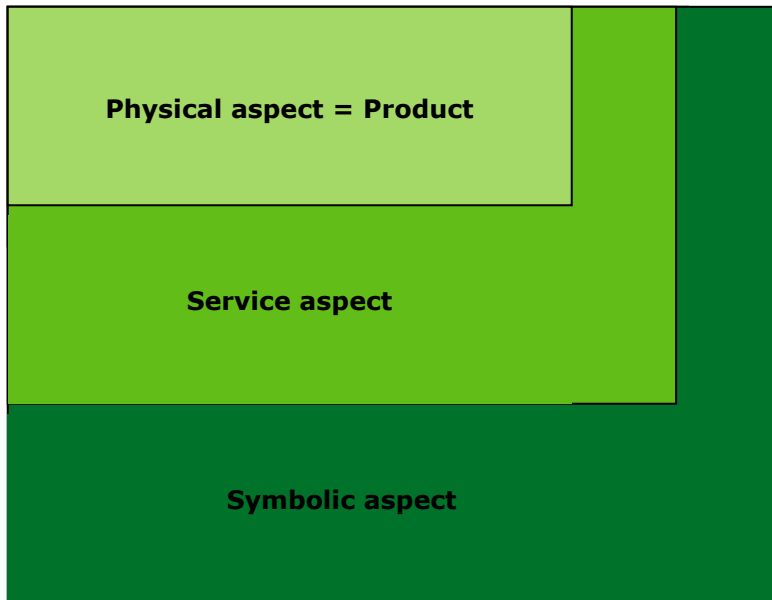
Figure 11. Product image is affected by the physical, service and symbolic parts (Iltanen, 2000).

A magazine is a typical example of a product that combines aspects of physical end product, service and symbolism. The physical end product includes the appearance of the magazine - the layout, the printing and the paper. Special effects in advertising are also included in the physical product. The content of the service part varies in different parts of the magazine's value network. Service is mainly provided to the following step in the value network, i.e. service from the publisher to the advertiser, service from the printing house to the publisher. The symbolic part, on the other hand, includes the target group – the definition of the target group, penetration into the target group, information on how the target group reads the magazine, etc. Editorial content is also part of the symbolic aspect.

In this research one of the goals is to clarify the roles of service aspect and symbolic aspect of paper in customer satisfaction. The role of paper in building the symbolic and service aspects of a magazine is also of interest. In order to reach the goals, the product properties are divided into three groups, i.e. physical, service and symbolic, for further analysis.

2.6 Defined limits of the study

The following simplifications were made in the case study:
- The interviewees were all Finnish, and thus the results only depict the situation in Finland.
- The magazines of interest were women's monthly magazines or similar based on quality expectations.
- The printing process used in the printing houses was heatset offset.

3 REQUIREMENT ANALYSIS – CUSTOMER NEEDS IN THE PAPER DEVELOPMENT PROCESS

The generic product development process stems from the identification of customer needs and their translation into technical terms. General techniques for gathering the requirements are interviews, focus groups and observing the product in use (Preece, 1994; Ulrich, 2000). Customer needs are prioritized, e.g. basing the importance assessment on further customer surveys. Customer needs are then translated into technical terms. The leading methodology is Quality Function Deployment (QFD). Target specifications for the technical properties should also be established (Ulrich, 2000).

The requirement analysis method has been developed to allow customer requirements to be taken into account right at the start of the paper development process. Requirement analysis is an application and combination of the methods described in this thesis in chapter 2 Methodology. The objective of the requirement analysis is to identify the customer needs and translate them into technical terms relating to the paper. Based on recommendations from the literature (Ulrich, 2000), it consists of the following four steps:

1. Identification of the ***value chain or network of the end product***. Requirement analysis is a tool for gaining a greater understanding of the customer's business, and hence the requirements of the customer's customer are also of interest. The aim is to use this understanding to develop the paper in such a way that the expectations placed on the properties and quality of the end product (e.g. a magazine) can be fulfilled.
2. Identifying the ***critical end product properties throughout the value network***. First the interesting representatives of the value network are identified. The data is gathered by interviewing several representatives in the parts of the value network that is of interest. The order of the interviews is opposite to the supply network, that is, the end customer is the first to be interviewed.
3. Finding the ***links between customer expectations of end product quality and paper characteristics using QFD***. The customer expectations in different parts of the value network are analyzed using QFD, which helps in prioritizing the desired paper characteristics based on customer needs. The QFD analysis is performed for different sectors of the value network separately, and thus provides information about the differences between expectations in different parts of the value network.

4. ***Classification of paper characteristics based on Kano's theory of attractive quality***. The relevant paper characteristics are classified according to Kano's model in order to determine which paper characteristics might be the ones that give a competitive advantage, which have to be fulfilled in order to do business, and which are properties to which the customer is indifferent. Kano's model is used because of its role in complementing the results of QFD (Karjalainen, 2004; ReVelle, 1998).

The work flow and the results of each step are presented in Figure 12. The corresponding chapters of this thesis are also included in the figure.

	Value network	Customer data	Customer requirements vs. paper characteristics	Classification of paper characteristics	Product analysis
Method/ tool:	Literature review	Interview	QFD	Kano	
Results:	Supply network of the end product	-Business environment, responsibilities in value network -Quality requirements using customer's expressions	-Priorities for customer requirements -How are customer requirements fulfilled? -Identification of the paper characteristics that help to fulfil the requirements	Classification of paper properties? identification of the possibilities and needs for development	
Chapter:	4	2.1, 5	2.3, 6	2.4, 6	

Figure 12. Work flow of the requirement analysis.

Requirement analysis helps paper companies to move from product-oriented paper development to customer-oriented development. It is the first stage in the paper development process and it gives input data on customer expectations for the following stage, i.e. product analysis. A fairly similar approach to customer-oriented product development has been taken by Chronéer and Kärkkäinen. However, in comparison to Chronéer's approach (Chronéer, 2005), requirement analysis concentrates on the very beginning of the product development process (Figure 6, p. 19) and is strongly product-oriented, whereas Chronéer focuses on project management. Requirement analysis also specifies more detailed tools that can be used in reaching the goals of the steps, whereas Chronéer concentrates on defining the goals. The need assessment tools developed by Kärkkäinen et al. (2001) are quite close to requirement analysis: as an example, Table 4 compares need assessment tools and requirement analysis in common need assessment problems. In requirement analysis several need assessment tools are combined in one step; for example the linking of customer expectations with paper characteristics using QFD (Step 3 in the requirement analysis) combines tools 5 (Voice of customer interpretation table), 6 (Competitive position assessment) and 7 (House of Quality) in Kärkkäinen's approach (Table 4)*.* However, requirement analysis has been developed to complement the product development process currently used in the paper industry. Thus, no major changes are needed in order to start utilizing it.

Table 4. Selection table for need assessment tools in common need assessment problems compared to Aikala's Requirement Analysis, adapted from (Kärkkäinen, 2001).

Legend: **D** = dark green = A solution to the problem; **L** = light green = A useful tool. Columns 1–10 grouped under *Kärkkäinen*.

	1. Need assessment outline	2. Creative group interviews	3. Framework for 1-to-1 interviews	4. Trace matrix for business chains	5. Voice of customer interpret. table	6. Competitive position analysis	7. House of quality	8. Pugh concept selection table	9. Problem source assessment	10. Assessment of future competitiveness	Requirement analysis
Customers, customer relationships											
1. The concept 'customer' is not clear - whose needs should be met?	D			L							D
2. What is known about customers' needs - what more has to be known?	D	L		L							D
3. From which sources can information about customer needs be found?	D			L							D
4. The customer does not see the customer orientation of a company		D	L			L					L
5. There are few contacts between company and customer		D	D			L					L
6. The needs and goals of the customer are unknown		L	L		D						D
7. The customer cannot express his needs/needs are not understood		D	L		D						D
8. It is difficult to see the whole picture of customer needs				L	D		L				D
9. The customer's business chain is long or complex				D							D
10. Difficult to distinguish important needs from less important needs			L			D	L				D
Internal communication											
11. Information about customers is not properly communicated within the company		D		L		D	L				D
12. Employees are not committed to satisfying customers' needs		D		L		L					D
Competitors											
13. Competitive situation is not known or evaluated systematically			L			D					L
Development activities, Product development											
14. In development meetings time is wasted on irrelevant issues						D	D	L	L		D
15. Clear goals for product development are difficult to set						L	D				D
16. Customer needs are not sufficiently taken into account at the development stage								D		D	L
17. There are difficulties in choosing the best concepts from many alternatives								D		D	L
18. There are difficulties in assessing the competitiveness of a new product			L							D	
19. Lots of defects usually occur after the launch of the product									D		
Colors:											
A solution to the problem	D										
A useful tool	L										

4 CASE STUDY: REQUIREMENT ANALYSIS FOR MAGAZINE PAPER

The future of magazines is often considered to be one of the brightest among paper-based products. They are attractive advertising media due to their ability to reach their target group, the large number of titles on the market, and a fairly loyal readership. The consumption of magazines does not, at least yet, seem to have encountered a structural break (Figure 1b). In the case of magazines, the Internet and the electronic media as a whole is considered more as complementing than as competing media. Pesonen (2006) has evaluated the maturity of different paper products using the S-curve (Figure 13). In the curve, Customer magazines and Special interest magazines are in the Growth section. Magazines were selected as the case product in this study in view of their promising future expectations and the desire of the paper industry to keep it that way.
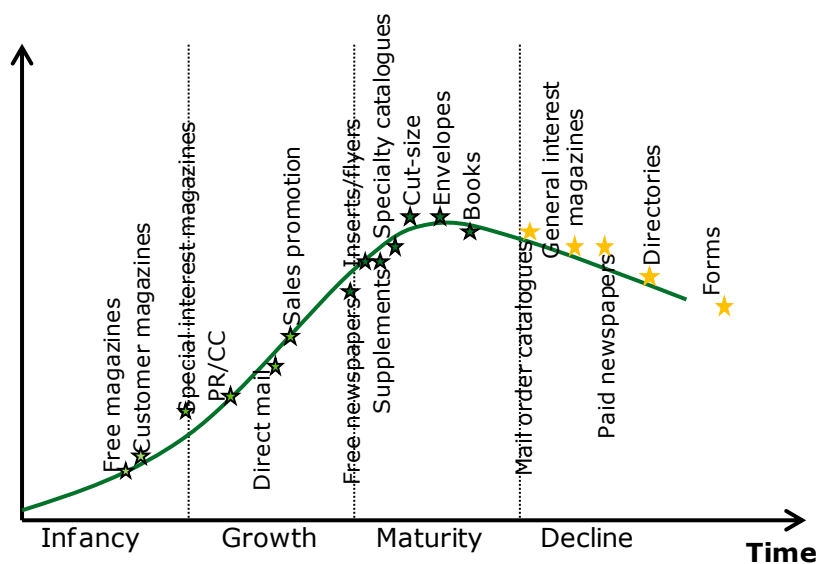
Figure 13. The stages of different paper products in an S-curve. Adapted from (Pesonen, 2006).

From the papermaker's viewpoint magazine publishing represents collaboration between the advertising sector, publisher, printer and papermaker. The different players in the magazine's value network place different emphases on quality requirements for the magazine itself and for the other sectors. This is illustrated in Figure 14. The aim of the case study is to identify the quality requirements originating from the different sectors and to convert them to paper characteristics by means of requirement analysis.
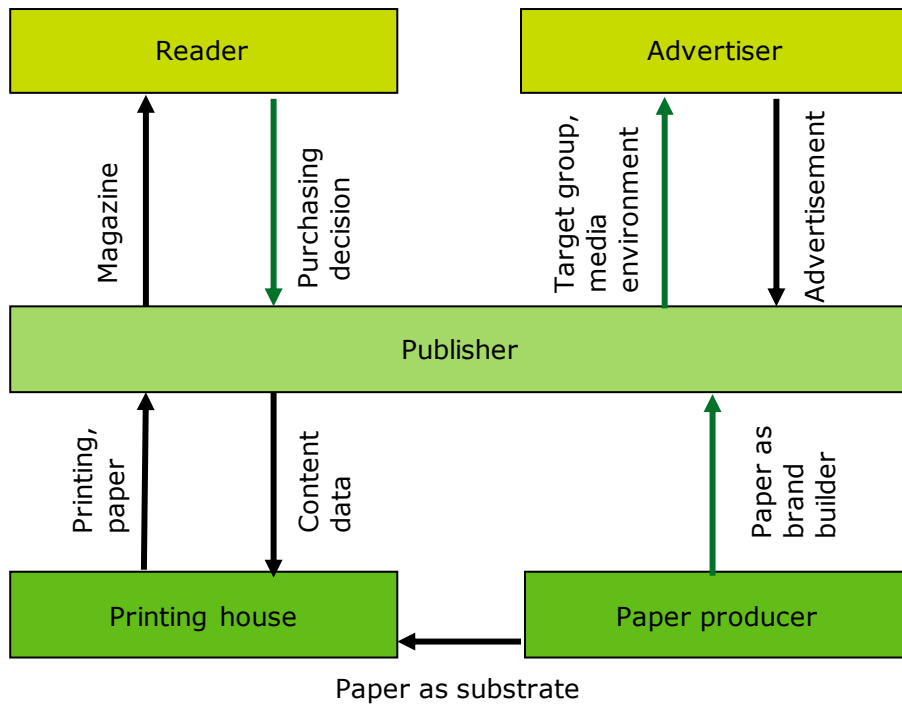
Figure 14. Links in a magazine's value network. Adapted from (Jernström, 2000; Birkenshaw, 2004).

The second target of the case study was to evaluate the feasibility of the method. Thus, the testing arrangement was limited by the following: the data was gathered from representatives of the Finnish magazine business, the target was women's magazines or similar, and the printing method was limited to heatset offset.

5 THE ROLES IN A MAGAZINE'S VALUE NETWORK

5.1 Advertising

5.1.1 Advertising – a combination of customership and provision of content

The function of the advertising sector in a magazine's production is twofold. Firstly, advertisements are an important part of the magazine's content and in this sense the advertising sector is a content provider. Secondly, the advertising sector is a major financer of magazine publishing, i.e. it is a customer of the publishing sector (McCann, 2004; Locks, 1996). As a customer, the advertising sector makes demands on the magazine's quality. Due to this twofold character of the advertising sector the interface between publisher and advertiser is complex – the publisher also makes demands on the advertisements.

The requirements imposed on the magazine's quality by the advertising sector were investigated by interviewing several representatives of the advertisement's production chain. These are listed in Table 5. The structure of the interviews is presented in Appendix 2. The findings of the interviews are presented in chapters 5.1.2 - 5.1.7 and summarized and compared with the findings from the literature in chapter 5.1.8

Table 5.   Interviewees in the advertising sector.

Employer	Number
Advertiser	2
Advertising agency	4
Media agency	2
Repro house	2
Photographic studio	1
Total	**11**

5.1.2 Overview of the workflow in producing an advertisement

The design and production process for an advertisement or an advertising campaign requires cooperation between advertiser, media agency, advertising agency and repro house (Figure 15). The *advertiser* is the customer who has the product to promote. The advertiser briefs the media agency and advertising agency about the target and target group of the advertising campaign and provides budget information. The advertiser is involved in the design process to a lesser or greater degree and has the last word before the launch of the advertising campaign.

The *media agency* is a data bank of different media. It knows the media business and is aware of changes in it. The media agency produces a media plan with the advertiser for a one-year period. The media agency is the advertiser's representative in negotiations with publishers – it is the contact between advertiser and media. The media agency also knows the target groups, checks the advertisements when they are published and follows

up advertising campaigns. The media agency and advertising agency work fairly closely together during the design process.

> "*Mediatoimisto on niinkun hirveen tiiviisti meidän kanssa mukana kertomassa, että mitä tapahtuu*
>
> *mediassa ja minkälaisia juttuja kannattaa laittaa ja mitä pitää tehdä. (…) Meillä suunnittelijoilla se on,*
>
> *että missä viestit menee parhaiten perille, missä kohtaa ja minkälaisena tai se, että jos tulee joku uus*
>
> *media, niin että miten sitä kannattaa käyttää tai joku on käyttänyt jollain erikoisella tavalla.*"
>
> [*"We work very closely together with the media agency, which informs us about the things that are*
>
> *going on in the media and what kind of stories are worth doing. (…) For us designers it means where*
>
> *and what kind of messages go through, or if there is a new medium, how it can be used and if someone*
>
> *has used it in an unconventional way."*]
>
> *(Art director, working at an advertising agency)*

The *advertising agency* is responsible for the design of the advertisement within the limitations set by the advertiser. The schedule of the medium defines the schedule of the design and production process for the advertisement. During the production process the advertising agency works together with photographers and the repro house.

The *repro house* receives the information about the advertisement from the advertising agency. The repro house scans photographs, converts them to digital format and performs image processing including color control. Text and pictures are then combined. The product is the proof of the advertisement, which has to be approved by the customer before the advertisement is sent to the publisher's server. Advertising agencies appreciate high-quality proofs, although proofs are not always required. The data of the advertisement is sent in digital form from the repro house to the server from which the publisher receives it.
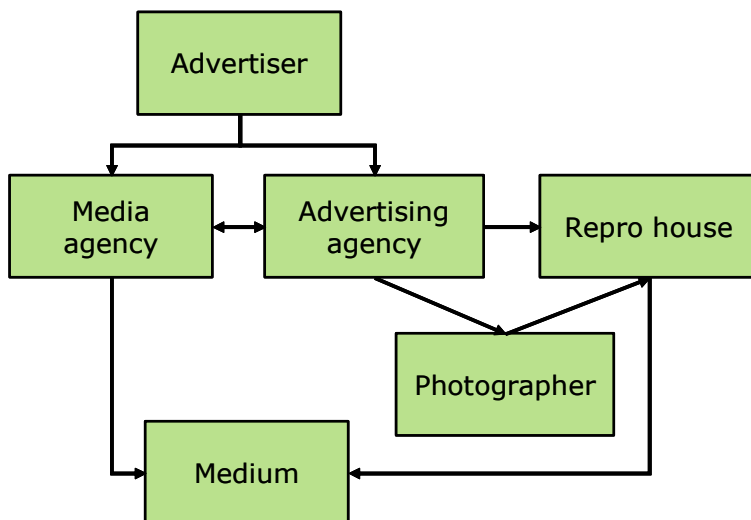
Figure 15.   Collaborating parties in the advertising sector.

The performance of the advertising sector depends on i) how well the reader has been taken into account in the design process, ii) performance in the publisher interface, and iii) collaboration within the advertising sector itself. The issues that were mentioned in the interviews are categorized under these three classes in order to identify the requirements imposed on the magazine's quality by the advertising sector.

5.1.3 The properties of an advertisement

In a women's magazine, a good advertisement catches the reader's eye and arouses her interest. The advertisement may be surprising, appealing, and experiential or it may be pleasant in some way. In any case, the advertisement should fulfill its communicational objectives, present the right information and give enough information for the consumer to act. Some general rules for designing the advertisement were mentioned:

− The advertisement should have only one target.
− No noise is allowed in the advertisement.
− The advertisement should be simple, only one issue at the time.
− The advertisement should look like the brand or product.
− The advertisement should be in harmony with the medium.
− The advertisement should speak to the target group.

> *"Mehän voidaan joutua puhumaan tyyliin jollekin 15-vuotiaalle hiphopparille tai jollekin eläkeläisryhmälle. (…) Se on ihan turha kuvitella, että silloin, kun mä olin 15, niin tää oli kova juttu. Se on just sitä ammattitaitoa ja sitä vartenhan niitä ryhmiä ja asenteita tutkitaan niin paljon."*
> *["We might have to speak to, let's say, a 15-year old hip-hop fan or to a group of senior citizens. (…) There's no sense in thinking that when I was 15, this was in. This is professional skill and that's why there is so much research done on different groups and consumer values."]*
> *(Project director, working at an advertising agency)*

There are different ways of meeting the requirements set for the advertisement, for example by using colors; on the other hand, a black and white advertisement can sometimes stand out. The use of special features is another ploy. Sometimes the product being promoted can disappear under a very surprising message. Knowledge of different papers and printing methods helps the design process. The target group of the advertising campaign can be fairly large and heterogeneous, in which case better results will be achieved by dividing the message into sub-groups with different designs. However, the advertising campaign's budget usually limits the number of versions produced.

A study of the effectiveness of the advertising campaign gives valuable information with which advertising agencies can improve their performance. Effectiveness can be assessed from the selling point of view or the image point of view. Customer satisfaction also plays an important role in improving performance.

5.1.4 Choice of media

The choice of media depends on the objective of the advertising campaign as well as on the product being advertised. The advertisement and its message should fit into the media environment. Of course the available advertising material also influences the choice of media. The choice of media and the design of the advertisement are decided between advertiser, advertising agency and media agency.

Magazine advertising is a rather conservative way of promoting a product. A magazine is a strong advertising medium if you want to say lots of things in your advertisement. The message is available for a long time in magazines and in this sense many readers see the message during this period. With a magazine, the reader can also return to the advertisement. Hence, a magazine is a powerful medium for building an image for the product. The long life can, however, also be regarded as a weakness if the goal of the advertisement is instant sales promotion. The long delay between sending the advertising material to the publisher and the magazine's publication can also be considered to be one weakness of magazines as an advertising medium.

5.1.5 The reader

From the advertising sector's point of view, the most important property of the magazine is its target group and how clearly it is defined. Nowadays the most important factor in defining the target group is lifestyle rather than traditional demographic criteria (age, sex, education, household patterns and geographical issues).

> *"…ikä, kyllä se aika paljon vaikuttaa kulutustottumuksiin, mutta myös puhutaan, että on kyse lifestylesta, että miten ihminen elää, että samanlaista elämää voi elää kolme-, viis- tai kuuskymppinen."*
> *["…age, it affects consumer habits quite a lot. But it's also said that it's about lifestyle, what kind of life people live. Life can be fairly similar for a thirty-year-old, fifty-year-old or sixty-year old"]*
> *(Media planner, working at a media agency)*

Cultural factors are especially important in international advertising. People in southern Europe act quite differently from those in northern Europe. How the target group uses different media is another important factor. It is not only readers' attitudes and habits that are important, but also the reading situation, and when and where the magazine is read. One strength of magazines as an advertising medium is that the reader is willingly reading the magazine and is interested in what she reads. However, the relationship between the reader and the magazine varies. Knowledge of reading habits and of readers' attitudes towards the magazine is highly valued. This information helps to determine what the advertiser wants to communicate and to whom the message should be delivered.

> *"Mä todella kritisoin sitä mielikuvituksetonta napinpainelemista, että haetaan vaan todellakin jotain OTS:ia tai kontaktimäärää. Että ei niinkun ollenkaan ajatella, että missä tilanteessa tätä lehteä luetaan ja minkä tyyppisiä ne ihmiset on."*
> *["I would strongly criticize that unimaginative pressing of a button, where only some OTS (Opportunity to See) or number of contacts is sought. That no thought is given to the reading situation of this magazine and what kind of people read it."]*
> *(Project Director, working at an advertising agency)*

The reachability of the message is vital from the advertising agency's viewpoint. General interest magazines naturally reach more readers than special magazines, although the latter have more specific target groups. Hence, the number of wasted contacts is larger with general interest magazines. The target group also finds the special magazine that interests them fairly easily. The reading of special magazines is more focused than the reading of general interest magazines and in this sense more attention is also given to advertisements. Unfortunately, the contact price is rather high for special magazines.

5.1.6 Publisher interface

The media agency is the contact between the advertising and publishing sectors. The media agency makes the contracts with the media and title to be used, as well as with the repro house, which delivers the advertising material to the publisher's server. In the publishing sector, the magazine's chief editor has considerable influence over the content of the magazine, including advertisements. The chief editor can drop the advertisement if it is not suitable for a particular magazine.

> *"Meillä oli sellainen tosi tyylikäs imagollinen mainos, jossa nuoripari istui sohvalla ja siinä oli kauniisti aseteltu lautanen, jossa oli pieni pihvi ja muuta…Eräs lehti ei ottanut sitä. Sieltä sanottiin, että heidän ideologiansa on sellainen, että ne ei suosi lihavalmisteita. Niillä on uusi päätoimittaja, mistä tämä johtui."*
>
> *["We had a very stylish advertisement with a young couple sitting on a sofa with a nicely put plate with a small steak and something else… One magazine title did not publish the advertisement. They explained that their ideology did not support the use of meat. They had a new chief editor who was responsible for this."]*
>
> *(Media planner, working at a media agency)*

Editorial content of the magazine

During every interview it was mentioned that the magazine's appearance, editorial content and advertising material form an entity, an image, which should convey one and the same message. The editorial content of the magazine also includes the magazine's ethics, which should be in line with the advertisement's ethics. For the advertising agency it is essential to be aware of the image of the magazine in order to know what kind of products could be advertised in certain magazines and how the advertisements should be designed in order to complete the entity and to catch the reader's eye. Advertisements also add value of the editorial content. Hence, it is important that the publisher provides information about the magazine's image and any changes in this image. Uniform quality of the magazine was mentioned several times as an important factor for the advertising agency. Advertising agencies also appreciate information about the most common advertisers in a certain magazine.

Technical specifications for advertising material

Appropriate specifications and technical requirements for advertisements make the design phase easier. Specifications include the format of the magazine and information about colors. For example, a model advertisement would be appreciated. However, as few limitations as possible would be ideal for the advertising agency. Creativity in the advertisement's design is limited by the extra cost.

Repro houses value information about the profiles of the printing presses with respect to different papers. The profile enables the translation of color data created on one device into another device's color space (ICC.1:2004-10). Unfortunately such profiles are seldom available due to the large number of paper brands and printing presses. Information about changes in the press would also be appreciated.

<u>The magazine's appearance and print quality and the factors that affect them</u>

The overall appearance of the magazine influences the use of an advertisement. Advertising agencies also consider the potential afforded by the size and shape of the advertisement in the design stage. A large number of options is much appreciated. The size and shape of the advertisement naturally depend on the size and shape of the magazine. It is more profitable to use magazines of the same size, as then the size of the advertisement would also be constant. For example, Reader's Digest is not a very attractive magazine from the advertiser's point of view because of its exceptionally small size.

> *"(Valituilla Paloilla) on yks ongelma, että se on niin erikokoinen lehti kuin muut aikakauslehdet. Jos ajattelee, että jos tän kokoiseen (A4) julkaisuun suunnitellaan ilmoitus ja kun sä et voi yks yhteen pienentää sitä, vaan sun täytyy mahdollisesti jättää jotain elementtejä pois… Valitut Palat jää mediasuunnitelmasta usein pois, koska se on erikokoinen"*
>
> *["(Reader's Digest) has a problem because its size is different from other magazines. If an advertisement is planned for an A4 sized magazine and you can't reduce it one-to-one, you would probably have to leave some elements out… Reader's Digest is often left out from the media plan because of its different size."]*
>
> *(Media planner, working at a media agency)*

Special features would also be valued but they are quite expensive and sometimes even impossible because of technical limitations. The magazine's layout is important. A prominent position for the advertisement and placement among competitors help to catch the reader's eye. However, placements specified beforehand are quite costly. Advertising agencies appreciate it if the advertisement's environment is considered both editorially and physically. Advertisements should be placed between or into article pages rather than collected together on the first and last pages of the magazine. From the repro house's point of view the placement of the advertisement is important in special situations, for example if the color adjustment is not constant throughout the magazine.

Foreign language skills in Finland have improved during the past few years, which means that the appearance of magazines has to be of an international standard. From the advertising sector's point of view, high print quality means uniform print quality, elegant and well edited pictures, a variety of colors and shapes, reproduction of original pictures and colors, brightness of colors and color register. Dark images are considered difficult and in this sense large solid black areas are often avoided in advertisements. Images on the other side of the paper and how they affect the advertisement are also noticed.

It has been realized that the paper used limits the achievable print quality. The more important the role of the picture in an advertisement, the more critical the paper quality. Paper color limits color rendering, while dot gain is more pronounced with grayish papers. The advertising sector regards a high-quality paper as white, glossy, thick and opaque. The trend is towards higher-quality papers, especially in women's magazines. Environmental issues were mentioned as a possible factor in paper selection. Other paper-related issues that were mentioned were that the paper should feel right, that the

promotional item should be in harmony with the paper, and that non-glossy paper is preferable for reading.

Representatives of the advertising sector regard the overall paper quality in Finland as high. From the repro house's point of view all papers within a certain grade are the same regardless of the manufacturer. However, problems with paper and print quality can occur in the case of free sheets. Although paper quality and print quality were mentioned as important factors in the advertisement's appearance, the idea behind the advertisement is far more important.

5.1.7 The future of magazine advertising

Magazines will continue to be an important medium for advertisers in the future. However, the expansion occurring in the media field will pose challenges. The consumer should be surprised by the advertisement, and this affects the choice of media. Different variations of the same message according to title were mentioned as a possible trend in the future. Special features, for example accordion-shaped advertisements, will also be of interest. Globalization means the design process will be centralized and adapting international advertisements will become more common.

In the advertising sector the role of repro house is changing towards data management. Sometimes it might be possible to omit the repro house from the design process, and the advertising agency would then deliver the material straight to the publisher. The digitalization of photography may change the distribution of work within the advertising sector.

5.1.8 Summary

The results from the interviews concerning the advertisement's production process were very similar to those described in the literature. The properties of an effective advertisement mentioned in the interviews were also in line with those found in the literature (Iltanen, 2000; Kotler, 1997).

The interview findings confirm the statement by Iltanen and Kotler (Iltanen, 2000; Kotler, 1997) that the choice of media is based on the advertising budget, communicational targets, and the target group of the advertising campaign. According to Consterdine (2005) one of the magazine's strengths as advertising medium lies in the wide variety of titles, allowing targeting to be achieved with precision and without unnecessary contacts.

The needs of the advertising sector were strongly related to the target group as well as to the magazine's brand and editorial content. The advertisement should fit into the magazine, and thus, the technical specifications for the advertisement are also appreciated. This is in line with Consterdine (2005), who states that "In the sympathetic context of the right magazine, the strong positive brand values of the magazine can transfer onto the advertisements." He also proposes that, unlike digital media,

advertising is an integral part of magazines and sometimes can even be compared with the editorial content.

The role of the paper in magazines was discussed in the interviews, but the interviewees pointed out that decisions concerning paper are made by the publishing sector. However, paper properties are naturally considered in the advertisement's design process. The most important role of the paper from the advertisers' point of view was its effect on print quality: color rendering, the number of shades that can be achieved, and picture rendering. The paper properties mentioned in this context were gloss (higher gloss – better color rendering), thickness (greater thickness better), whiteness, and porosity (lower porosity better). However, it was mentioned that trends influence the desired paper properties. Other sensory properties, the feel and sound of the paper, were also important to the advertisers. These properties affect the image of the paper, which was also considered important. Uniformity of paper quality was also mentioned.

Advertising expenditure is shifting from the traditional media to the Internet. During times of economic uncertainty advertisers shift even more of their budgets online because Internet advertising is cheap, and easy to target and customize for particular audiences (ZenithOptimedia, 2008). Obviously, the Internet is attracting advertising money from traditional advertisers but on the other hand it is creating new businesses, for example on-line magazines, which will boost print advertising. The unique strength of magazines as advertising media is the fact that advertisements in magazines are not irritating, quite the reverse. In fact, advertisements are an important part of a magazine's content (Consterdine, 2005). Thus, the challenge is how to stop the decline in the number of magazine readers (KMT, 2007).

5.2 Publishing

5.2.1 The magazine – editorial content packaged in print format

The target of this part was to identify the most important quality components in magazines from the publisher's point of view. The aim was also to clarify the publishing process of a magazine title: who makes the decisions that might affect the magazine's quality and how the needs of customers, i.e. advertisers and readers, are taken into account. The data was gathered by interviewing several professionals in the publishing sector. The interview themes are presented in Appendix 2. The interviewees are listed in Table 6. The interviewees were selected based on the following criteria:
- The professionals had to have power and responsibility in their magazine.
- Both business expertise and journalistic expertise had to be represented.
- Different sizes of publishing enterprises had to be included.
- The interviews had to cover both new and updated magazine titles.

The findings of the interviews in the publishing sector are presented in chapters 5.2.2 - 5.2.5 and summarized and compared with the findings from the literature in chapter 5.2.6

Table 6. Interviewees in the publishing sector.

Profession	Size of publisher (Anon., 2008a)	Number
Planning manager of a magazine group	Large	1
Development manager	Large	1
Editor-in-chief	Large	1
Editor-in-chief	Medium	1
Editor-in-chief	Small	1
Total:		**5**

5.2.2 Overview of magazine publishing

A magazine as a product is built around its editorial content and the base is in journalistic principles. Each issue of a magazine is a ready-made package of items that represent the world today. The layout of the magazine enables the reader to start reading anywhere between the covers. In international magazine brands, some of the content is adapted from issues published in other countries, and the rest is produced locally. The advertisements are usually local, especially those concerning fashion. The number of pages in one issue changes according to the number of advertisements. Basically there is no upper limit for the number of advertisements. Editors are aware of the material that is included in the magazine. However, the printed proofs of the issue do not cover all the pages but only the most important articles and advertisements. The editor-in-chief is in charge of the content.

Magazines are designed to please the reader

The quality of the magazine is defined in the publishing sector as quality of content: the content speaks to the reader – it is relaxing, entertaining and topical. Quality also means respect from the reader and from the media business. Magazines are designed primarily for their target group, i.e. readers. The definition of target group is based on ideology, values and opinions. Publishers closely follow the values, attitudes and behavior of their readers by taking part in surveys such as RISC Monitor, National Media Survey and Intermediasurvey. The reader profiles of different magazines are based on the information gathered.

> *"Meillä suurin ikäryhmä tilaajista on 25-40 vuotiaita, että varmaan keskivertolukija olis siinä kolmissakymmenissä ja siitä kumpaankin suuntaan vaihtelua. Meillä on naisia vähän enemmän kuin miehiä, se menee 60/40. Meillä on yliedustettuna korkeasti koulutetut ja ylemmät toimihenkilöt. Pääkaupunkiseutu ja Tampere, ne muodostaa 2/3 tilaajista, mutta sit me kyllä levittäydytään koko Suomeen. Että tavallaan yhdistävä tekijä on maailmankatsomus ja tavallaan niinku kiinnostuminen tämän ajan ilmiöistä ja halu pysyä kartalla jollain kaupunkiliberaalilla ajattelutavalla."*
>
> *["Many of our subscribers are between 25 and 40, the average reader is probably around 30 with some variation in both directions. We have slightly more women than men – the ratio is around 60/40. Highly educated and professional and managerial employees are over-represented. The Helsinki metropolitan area and Tampere cover 2/3 of subscribers but we cover the whole of Finland. The sort of combining*

factor is the ideology and interests in the phenomena of our time and the need to stay on the map in a sort of urban liberal way."]
(Editor-in-chief, small publisher)

The editors of a magazine are experts in communicating with the target group and the basis for planning the content is the reader profile. Publishers collect feedback from readers. Feedback concentrates on content- and schedule-related issues. Technical errors are found mostly in inserts, which are therefore also often mentioned in feedback.

The way a magazine is normally acquired (subscription or buying a single copy) depends on the reader group and thus influences the magazine's design. Single copy sales affect the appearance, format and layout of the magazine. The cover of the magazine catches the reader's eye and encourages him/her to pick up a copy. However, the buying decision is based on the editorial content of the magazine. At the moment, the most common way to acquire magazines is through an annual subscription, and in Finland there are only a few magazines aimed at single-copy sales. Selling single copies is considered to be a potential market. From the publishers' point of view, selling a single copy is the best marketing material for the magazine title. Young people tend to buy single copies because they cannot afford yearly subscriptions. Including topics of current interest also increases single copy sales. For the publisher, the aim is to bind the single copy buyer to the magazine and thus encourage her to take out a subscription.

"Miten saadaan nuoria uskollisiksi lukijoiksi? Irtonumeroiden kautta saadaan nuoria kiinni, mutta miten saadaan ne jäämään koukkuun. Siinä on tehtävää ja yksi tietysti on se, että meillä on lehti talossa, joka heittää sisään nuoria lukijoita. Saa sitoutumaan ylipäänsä aikakauslehteen. Sitten voi jatkaa sitä ketjua. Tuotesalkut on sitä varten, että uusia sukupolvia osataan vähän (lukea)."

["How do we get youngsters as loyal readers? Through single copy sales we can catch them, but how do we hook them? That's something we need to work on. Of course we have a magazine title in our publishing house that attracts young readers. It makes them commit themselves to magazines in general. They can then continue. Product portfolios enable us to read the new generations."]
(Planning Manager of a magazine group, large publisher)

Borrowing is another fairly common way to acquire magazines. Some publishers take this form of recycling, combined with long reading times, into account in articles. These publishers also think that lending and borrowing a copy motivates the editors and is desirable. However, other publishers consider this kind of recycling to be an unwanted phenomenon. The magazine should be so attractive to the reader that he or she wants it to be new and fresh. In these cases, recycling does not affect the content of the magazine. In some magazines attempts are made to avoid recycling by awarding subscriptions to friends.

Advertisers seek the correct reader profile with a tempting environment

A clear reader profile is important for the advertiser, who naturally wants to reach the correct readership. On the other hand, the publisher wants to offer an environment in which advertisers want to be seen. A tempting environment includes both the editorial content and the appearance of the magazine. Permanency is important in appearance. The impression of a high-quality magazine with high-quality pictures is offered. Visual

issues are becoming more and more important and the variety of pictures is increasing. The tactile/haptic properties of the magazine are also considered important in appearance. Publishers collect their own databank on advertisements and their visibility. The databank is based on research issues and, say, an ABC survey.

> *"Meillä on ilmoituskoot määritelty, joka lähtee lehden formaatista ja palstarakenteesta. Tietysti joustetaan niin pitkälle kuin pystytään. Tietysti me sitten hinnoittelulla pyrimme ohjaamaan ilmoitusasiakkaita järkevään suuntaan plus, paitsi, että me tutkitaan lehtien lukijoitten mielipiteitä sisällöstä, meillä on myös aika hurjankokoinen tietopankki ilmoituksista, miten ne koetaan ja kuinka ne toimii."*
>
> [*"The sizes of advertisements are set and based on the format and the column structure of the magazine. Of course we are as flexible as possible. Naturally we try to guide our advertising customers in reasonable directions through pricing. Plus we study readers' opinions on the editorial content and we have a very large data bank of advertisements, how they are experienced and how they work."*]
>
> *(Planning manager of a magazine group, large publisher)*

Magazine's brand affects the choice of paper

The paper for the magazine is selected according to the magazine's brand. The guidelines in paper choice depend on the type of magazine: whether text or pictures is more important, paper grammage, paper thickness, haptic properties, gloss, opacity, whiteness and printing method. Paper quality, reliability of delivery and price are naturally also very important factors.

> *"Kun puhuttiin paperin laadusta tai lehden laadusta, puhuttiin lähinnä visuaalisesta laadusta kuten kuvien toistumisesta, sitten on tietysti haptisuus eli miltä se tuntuu ja sitten on tietysti myös se kokonaisuus, kun ajatellaan taittamista."*
>
> [*"Talking about paper quality or a magazine's quality means mostly visual quality, like picture rendering, then there are haptic properties – what it feels like – and then there is the overall impression, which includes layout."*]
>
> *(Development manager, large publisher)*

The management of the publishing company makes the decisions concerning paper. The editor-in-chief carries profit responsibility and thus his opinion is taken into account in paper selection. The printer should also be satisfied with the paper and thus the printing house has an important role as a consultant in paper choice. Paper mills have direct contacts with the publisher's representatives and also with the editors-in-chief of larger publishing companies. From the publisher's point of view, it is preferable to have only a few paper suppliers. The publisher regards differences between paper brands within a certain paper grade to be small compared to other variations in the process, i.e. image processing and printing.

In Finland, and especially in Russia, higher-quality papers are used than in continental Europe. In Belgium and the Netherlands, for example, most magazines are printed on SC paper. Publishers are aware of developments in the paper industry well before the launching of a new or enhanced paper product. Paper development usually means brightness and whiteness improvement. The trend towards increased whiteness is due to the preferences of consumers and advertisers. Graphical issues do not limit the use of different papers, and technical solutions are available. Publishers do not want to come

into conflict with environmental organizations and thus one criterion in paper selection can be environmental friendliness.

Competition with other media

Magazine publishers regard magazines as ready-made packages of information and entertainment which have no serious competitor among other media. Other printed products like books, newspapers and also other magazines are regarded as primary competitors. Primary competitors are those that have the same or very similar target group. Secondary competitors are those that are used by the same target group although they are aimed at some other group, e.g. a women's magazine is a secondary competitor to a magazine targeted at teenagers. The digital media are not seen as a competitor, though it is always a question of how people want to spend their time.

> *"Ei ne sähköiset ole tähän päiväänkään mennessä mitään tämän (lehti-)talon lehteä kaatanut. päinvastoin ne pitää nähdä kaikki sähköiset mediat vaan tukemassa näitä lehtiä. Ne on jonkinlainen lisä. Sieltähän tulee kansiaiheita, siis telkkarista ja elokuvista."*
>
> *["So far the digital media have not been able to kill any of the magazine titles in this publishing house. On the contrary, all digital media should be seen as supporting magazines. They are some sort of extra. From digital media, especially TV and movies, we get topics for our covers"]*
>
> *(Editor-in-chief, large publisher)*

Many Finnish magazines have their own Internet sites, which are mostly used to promote the magazine and as an advertising platform. However, the main product is the printed magazine and the Internet site's task is to support the printed version. Some Internet sites have very active users and a range of options such as chat sites, competitions and Gallup polls, but these are specialties. The advertising on Internet sites is seldom integrated with the advertising in the magazine, although some of the advertisers are the same on the Internet and in the magazine. Internet sites are available for both subscribers and single-copy buyers.

5.2.3 Publishing a new issue of a magazine title

The magazine publishing business involves tight schedules. The publication date naturally sets the schedule for the publishing process. Publication dates are fixed for one year at a time. At the same time the contents of each issue are roughly defined and theme issues decided on. Advertising contracts are also made for a one-year period. Media sales start in the fall of the previous year. Naturally it is also possible to buy advertising space with a shorter time span and for individual issues. The trend is actually towards shorter time spans in media sales. Figure 16 presents a scheme of the workflow in publishing a monthly magazine.

> *"Me ollaan aikataulubisneksessä. Me lyödään lukkoon ilmestymisaikataulut aina seuraavaa kalenterivuotta silmälläpitäen elokuussa, jolloin myös lähtee painatuksen aikatauluttaminen. Meillä ja painoilla on syyskuussa tiedossa mitä tulee arkki arkilta."*
>
> *["Our business is based on schedules. The publishing schedule for the following year is set in August, when the scheduling of printing also starts. We and the printing houses know in September what will be coming sheet by sheet."]*
>
> *(Planning manager of a magazine group, large publisher)*
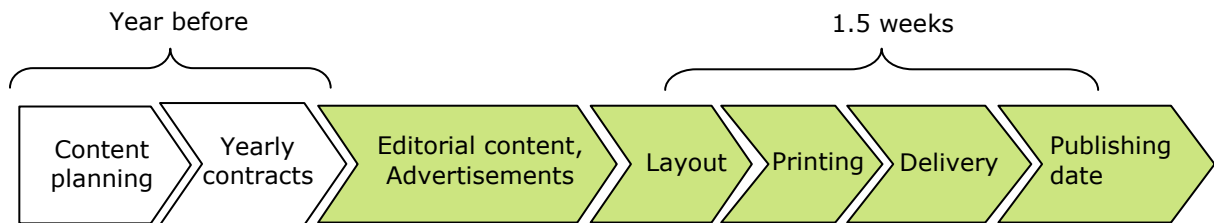
Figure 16. Workflow in publishing one issue of a monthly magazine.

The schedule is most critical in the case of weekly magazines. It is possible to catch up a 24-hour delay in the schedule, but magazines are seldom late. The reason for being late is usually something other than uncompleted articles. The technical process in magazine publishing is advanced and getting faster with advances in information technology and digital imaging.

Magazines are updated quite regularly. The appearance of a magazine is constantly changing. This revision is part of magazine marketing and advertisers and other partners are well aware of it. The initiative and vision for the revision come from the editors. The aim is, of course, to gain new readers, and thus to become a more attractive advertising medium, but also to bring the magazine up to date and clarify its profile. When a magazine is to be changed substantially the paper choice is also reconsidered. Such changes are not prominently marketed to readers, in fact the readers should recognize the change themselves.

> *"Me tehdään säännöllisesti tutkimuksia, joista seurataan kehittymistarvetta. Ei suoraan niin, että kysyttäisi lukijoilta mitä pitäisi muuttaa, koska sieltä ei vastausta tule. Kyllä sen täytyy tulla toimituksen sisältä se muutosvisio. Mainostajilta tulee toiveita, mutta ne suodatetaan lukijan parhaaksi. Mainostajia kyllä kuunnellaan ja keskustellaan, mutta ydinajatus on olla riippumaton."*
>
> [*"We regularly perform studies which we use to follow the need for development. We don't ask the readers directly about what should be changed, because we wouldn't get any answers. The vision of change must come from the editors. Advertisers express their wishes but they are filtered for the readers' benefit. We listen to the advertisers and talk with them but the idea is to be independent."*]
> (Planning manager of a magazine group, large publisher)

Launching a new magazine title

The idea of a new magazine title stems from innovations by the publisher or is driven by the market. Publishers also scan international markets, pick up new ideas there and adapt them to their local market. New magazine titles can also be former special issues of another magazine, which become independent titles. Launching a new magazine title is an expensive process including market surveys and advertising campaigns. Usually the target is to create a long-lived product. Sometimes a new magazine title can be a so-called one-shot, when only one issue is published for a certain purpose.

In the case of a new title both content and appearance need to be considered and defined. Appearance includes format, layout, fonts, colors, printing method and paper. The format is based on the limitations of the printing press, which means the amount of waste paper is important. Special formats can be used for effects, but in Finland smaller formats, so called hand-bag sizes, are not very popular. Paper choice is based on the

papers used in the publisher's other magazines in the same magazine group. Grammage means optimization of quality and the cost of paper and delivery.

> *"Aikakauslehtibisnes on muutenkin vähän luovaa eli kovin insinöörimäistä prosessia ei ole olemassa (paperin valintaan). Se lähtee näistä olemassa olevista lehdistä ja mitä papereita niissä on käytetty. Sitten käytetään painajaa konsultoimaan siinä, että onko muita vaihtoehtoja tai sitten omia resursseja, että käviskö tähän joku muu tai löytyiskö tähän joku kiva vaihtoehto."*
>
> *["The magazine business is quite creative, which means that we don't have a very scientific process (in selecting the paper). The starting point is existing magazines and the papers used in them. Then we use printers as consultants to find options, or we use in-house resources to see if some other paper would suit or whether some acceptable alternative could be found."]*
>
> *(Development manager, large publisher)*

5.2.4 Collaboration in magazine publishing

Magazine publishers work together mainly with the advertising sector and the printing sector. The publisher's media service has direct contacts with advertisers and media agencies. Media agencies usually fix the schedule for the advertising material based on the publication date and the printing schedule for the magazine. Information on the number and quality of advertisements is saved to the media sales system. The function of advertising agencies and repro houses is mainly to supply the advertising material. In addition to the printing and finishing of the magazine, printing houses also provide the paper. Magazines are made ready for delivery in the printing house. Publishers also have direct contacts with paper mills, and some publishers are willing to be responsible for acquiring the paper in the future.

Aside from subscriptions, advertisements are the other major source of income in magazine publishing, and thus advertisers' wishes and suggestions are important information. Since the magazine title is a key advertising medium, the needs of advertisers are important, although they are only guidelines for the publisher. All advertisements are welcome, but if the advertisement, or advertiser, is questionable, the magazine's editor-in-chief discusses with the advertiser before going ahead. Some advertisers are strict about paper-related issues, and cosmetics brand owners are particularly conscious of quality. The inclusion of advertisements is guided by pricing, and inserted product samples cost extra.

The printing method chosen is based on the number of copies to be printed and the selection of printing methods used for other magazines from the same publisher. In Finland, most magazines are printed by heatset offset. Covers and smaller high-quality issues may be printed by sheet-fed offset. The printing house is chosen based on costs, familiarity, technical capabilities, efficiency, flexibility and realistic scheduling. With new magazine titles there are more degrees of freedom in choosing the printing house, and the selection is influenced by the magazine's needs. The rule of thumb is that a particular magazine title is always printed in the same printing house. Yearly contracts are made with printing houses. Printing houses may use ancillary printers, in which case the customer should be informed. Printing houses may do business with several publishers. A publisher can change his printer, and some do so fairly regularly. The reason might be a change in a magazine's format: some other printer might be able to print the new

format with less paper loss and thus at lower cost. Delivery or quality problems are also reasons for changing the printer.

The printing house is responsible for the printing schedule and for printing quality and finishing. Printing houses are not as advanced in process control as, say, paper mills, but they are starting to give more attention to on-line control and monitoring. Color management, including color profiles of printing machines and color control, have also advanced in the last few years. The printer calculates paper consumption based on the printing schedules and the reserve supply of paper is quite small. This naturally increases the risk of running out of paper.

The printing house is heavily involved in paper acquisition. Printing houses recommend papers to the publisher and they also buy the papers. Paper is one part of the printing contract. It is in the interests of both the publisher and the printer to have as few paper suppliers as possible. The printer can minimize the number of stock items and can negotiate more advantageous contracts with the paper supplier, which also benefits the publisher. Reliable paper deliveries form the basis for long-term supplier relations. Availability is not a negotiable parameter; it is more like a limiting factor for suppliers from abroad wanting to get into the market. The benefit needs to be great before the paper supplier is changed. In the future, some publishers will be willing to buy the papers themselves, because they are prepared to be in control of the magazine as a whole.

> *"Saavutettavan edun pitää olla aika iso ennen kuin kannattaa lähteä ottamaan kokonaan uutta (paperin) toimittajaa. Tämähän on myös yhteistyötä painajan kanssa. Pitää olla sellainen tuote, johon myös painaja on tyytyväinen."*
>
> *["The benefit has to be considerable before a totally new (paper) supplier is used. This is also part of working together with the printing house. The product should be such that the printer is satisfied as well."]*
>
> *(Development manager, large publisher)*

5.2.5 The future of magazine publishing

Magazine publishers regard the future of magazines as bright. A magazine is a package of entertainment and information and no major competitors are on the scene. Thus, magazine publishing is considered to be a growing business area, unlike newspapers, whose major task in delivering news is diminishing.

The trend in magazine publishing is towards smaller and more specified target groups, and the number of magazine titles is already high in Finland. Competition between different magazines is therefore increasing. The loyalty of readers to a certain magazine title might change in the future. Gossip magazines in particular seem to suffer from a lack of loyalty.

New technology is seen more as an opportunity than a threat for magazines. One key issue is successful use of the Internet, e.g. the communities that are formed on different web sites. Hybrid media could add to a magazine's value, but the first hybrid media applications will probably have to be advertiser-driven. Advertisers are quite

conservative and careful and they want proof that new technological solutions work before utilizing them.

> *"Ilmoittajatkin ovat yllättävän konservatiivisia, vaikka he odottavatkin että meidän markkinoinnilla on luovia ideoita. Pitää olla jokin näyttö, mikä osoittaa, että tää ei voi mennä pieleen. Täytyy olla kokeiltu jossain."*
>
> ["Advertisers are surprisingly conservative, although they expect to get creative ideas from our marketing. They want proof that things can't go wrong. It should have been tested somewhere."]
> (Editor-in-chief, large publisher)

Publishers do not see e-paper as a threat to paper in the next ten years. However, it should be borne in mind that for the publisher the platform, i.e. paper, e-paper or computer screen, is irrelevant and the more important issues are the readers, the advertisers and the content.

> *"Aikakauslehden olemus on kustantamisessa ja tiedon paketoinnissa. En näe sitä elämää suurempana asiana, jos formaatti joskus vaihtuu ja se menee sähköiseen muotoon, kun sähköpaperi tai joku muu sen mahdollistaa."*
>
> ["The essence of a magazine is in publishing and in packaging the information. In my view it is not a major issue if the format is changed to digital when e-paper or something else makes it possible."]
> (Development manager, large publisher)

5.2.6 Summary

Based on the interviews, the publisher's focus is on the reader. A magazine is a brand whose content and appearance support each other and are designed to speak to the reader. The other important customer for the publisher is advertisers. In addition to the content and the appearance, publishers offer advertisers knowledge of the target group and its reachability. These findings corroborate Jernström's results in her thesis (Jernström, 2000).

For the publisher, a magazine's appearance and high print quality are important. In addition, the process from the editors to the reader should run smoothly and without errors. These properties, together with quality and runnability, were also mentioned by purchasers as the most important paper properties, in addition to price (Constant, 1996). The appearance of the magazine is influenced by the printing process and the paper. This is in line with Jernström's statement that publishers always look at the printed product as a whole and do not differentiate between papers and the overall appearance of the printed product (Jernström, 2000). The layout and planning of the appearance are naturally important as well, but they are the publisher's responsibility.

The interviewees confirmed Jernström's (2000) finding that publishers define the appearance and high print quality as visual quality and the feel of the paper. Visual quality depends on the reproduction stage, i.e. screening and color separation, on printing parameters and on the paper. The faults mentioned in quality include misregister, differences between two sheets when the picture continues from one sheet to another, hue or color errors, too much variation in print, ghosting and paper waviness, also known as fluting. The feel of a magazine naturally depends on the paper chosen, but also on printing.

The chain from the printing house to the consumer involves the printer (including printing and finishing), paper supplier, other suppliers, and delivery. The problems in this chain include finishing, e.g. cutting and binding, and problems with the availability of materials. For example, the printing house may run out of a certain paper. The availability of the paper is not negotiable; in fact it might be a reason to change the supplier. The printing house plays an important role in paper selection. In Finland, the printing house buys the paper in most cases. The printing house also consults publishers before the paper brand is decided. Surprisingly, paper is not included in Pira's illustration of a magazine's value network (Anon., 2004a).

The findings concerning the future of magazine publishing are very similar to those from other studies (Anon., 2008d, Anon., 2004a; Haarla, 2003; Grönlund, 2003). The future of magazines is bright in the publishers' view. It is felt that the digital media supplement the printed magazine rather than compete with it. Target groups will become more specific and thus the number of magazine titles will continue to increase. However, magazine publishers consider that the form of the magazine – digital or printed – is not crucial provided the readers are reached and the earning concept is clear. This was also mentioned in Birkenshaw's report (Birkenshaw, 2006).

Another vision of the future of magazines exists. In Birkenshaw's report (2006) the magazines of the future are seen as prestige items of very high quality, being relatively expensive and produced in relatively small quantities. The findings of Soirinsuo's master's thesis (2007) support Birkenshaw's results.

According to McCann (2004), publishers should increase single-copy sales to increase circulations and to attract advertisers. Concerning single-copy sales, McCann lists the same items as the interviewees: eye-catching covers, high-quality print and good contrast. A magazine could be distinguished from its competitors through the use of non-glossy covers, or by making it thicker and bulkier to give the perception of value. However, mailing costs always have to be minimized, and paper weight, bulk and opacity will have to be optimized.

5.3 Printing

5.3.1 The printing house – roles in printing and technical consulting

The aim of the interviews conducted in the printing sector was to clarify the role of the printing house in a magazine's value network based on the requirements of the publishing and advertising sectors. At this point the important role of the printing house in selecting the paper was already quite obvious. Thus, its role in consulting was of special interest.

The descriptions of the interviewees are listed in Table 7. The selection of interviewees was based on the following:
- Printing method: heatset web offset
- Printing houses of different sizes
- Viewpoints of different fields of expertise

The findings of the interviews in the printing sector are presented in chapters 5.3.2 - 5.3.4 and summarized and compared with the findings from the literature in chapter 5.3.5 The interview themes are presented in Appendix 2.

Table 7. Interviewees in the printing sector.

Field of expertise	Size of printing house (Anon., 2008a)	Number
Quality	Large	1
Production	Large	1
Marketing	Medium	1
Marketing	Small	1
Total:		**4**

5.3.2 Overview of the workflow in the printing house

For the reader, it is very difficult, if not impossible, to see a difference between different printing houses in the printed product. Thus, print quality is taken for granted and the selling arguments concern price, reliability of delivery and scheduling. Printing houses usually have one-year contracts with publishers. Normally publishers ask for offers from different printing houses when the contract ends. Printing houses compete through value-adding services, for example selective binding or special formats, in order to meet customer needs as widely as possible. The goal is in managing the comprehensive customership in order to make the change of printing house more difficult.

> *"Myyntiargumentteja on, sanokoot ostajat mitä vaan, mutta se hinta on keskeinen. Ei tarvitse olla ihan halvin, mutta meidän pitää olla 3-4 joukossa ja hintaeron pitää olla kohtuullinen. Sen jälkeen tulee toimitusaika ja ennen kaikkea toimitusvarmuus. (…) Laatu pitää olla itsestäänselvyys. Painotyön laatu, jäljen laatu. Kyllä mä väitän, että jos sulla on kolme painotalon lehdet, niin et sä siitä jäljestä näe, että missä se on painettu."*
>
> *["There are selling arguments, though the buyer might say differently, but the price is the main one. We don't need to be the cheapest, but we must be among 3-4 and the difference between the (cheapest) prices should be reasonable. Next comes delivery time and above all the reliability of deliveries. (…) Quality is taken for granted. The quality of printing, the print quality. I claim that if you have magazines from three different printing houses, you can't see from the printing where it was printed"].*
>
> *(Marketing manager, medium-size printing house)*

<u>Workflow in a print job</u>
The role of the printing house has changed during the past few years in the pre-press part of the print job. The reproduction work used to be done mainly in the printing house, but nowadays most customers prepare the material themselves and supply it to the printing house digitally in pdf format with the information on the run length and mailing addresses. The role of the printing house has changed from the actual pre-press

work to training and consulting the customer in preparation of the material. On the other hand, advances in technology, e.g. the change from using films to Computer-to-Plate (CTP) technology, has speeded up the shift from using the printing house in the pre-press stage to the preparation of material by the customer. Proofs are seldom available at the printing press.

The production control system automatically ensures that the appropriate paper, printing inks and printing plates are employed on the printing press. However, information about the paper is put into the system manually. The printed sheets are bound, attachments are added and addresses are printed. The magazines are then sorted and the post takes care of the delivery.

Selecting the paper

The roles in paper selection are presented in Figure 17. The publisher chooses the paper with all its limitations, i.e. in some cases compromises on paper quality have to be made because of price. The printing house acts as a consultant. Paper is part of the magazine's message and the choice is based on the impression of feel and visual image, paper weight and distribution, and paper costs. Seen from the perspective of the printing house, paper plays a bigger role in the end result than printing, and the paper should therefore be considered at the planning stage of the magazine. The starting point is the suitability of the paper; however, price is always decisive. Quality errors can occur as early as the paper selection stage.

The printing house buys the paper. This is the best way to get a reasonable price, handle the logistics (for example manage different roll widths when the number of pages changes at a late stage), manage the warehouse and take paper losses into account.

> *"Eihän se ole pelkästään, että neuvotellaan paperihinnat kerran vuodessa. Se on melkoista ruljanssia vuoden varrella, logistista hoitoa koko juttu. Mitä paperia, mimmoista rullaleveyttä, kun sivumäärät vaihtuu lyhyellä varoitusajalla. Onko se paperiostaminen sitä, että tekee vuosisopimuksen paperintoimittajan kanssa vai onko se sitä, että meillä on oikea paperi oikeeseen aikaan rullapukilla. Ja kenen pääomat on varastossa."*
>
> *["It's not only a matter of negotiating paper prices once a year. It requires lot of work throughout the year, logistical issues. Which paper brand? which roll width? when the number of pages changes at short notice. Does 'buying the paper' mean that you make a contract for one year with the paper supplier, or does it mean that you have the right kind of paper on the roll stand at the right time? And whose capital is tied up in the warehouse?"]*
>
> *(Production manager, large printing house)*
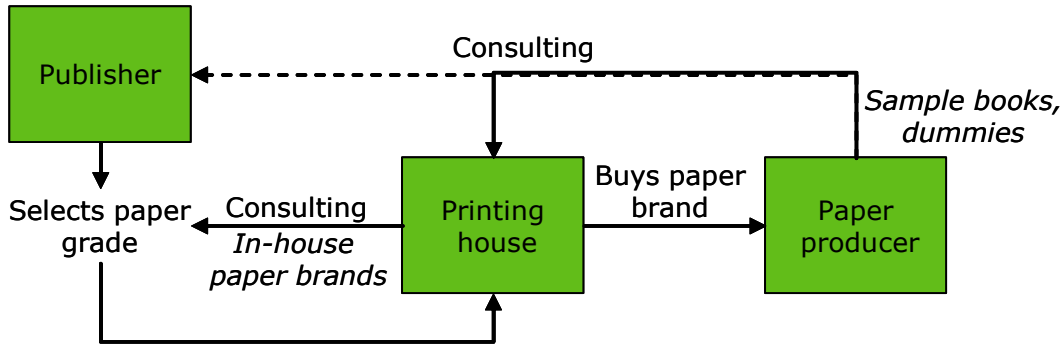
Figure 17. The roles in paper selection.

Printing houses offer paper grades to the customer, and normally in-house paper brands are used. If the customer is interested in some other brand, the paper brand selection is guided towards the in-house brands, e.g. by offering cost reductions. In-house brands are favored because they do not increase the number of stock items, and the printer is familiar with them and knows how they behave in the process. These factors are strongly related to the printing costs.

> *"Asiakas hakee kustannusetua vaihtamalla paperia ja on katottu, että tonnihinta on edullinen ja me sanottiin, että me tehdään koeajo siitä. Tuotantotehokkuus tippui ihan merkittävästi, että sen paperin pinta ei kestä niin hyvin kuin se aikaisempi paperi. Me ei paperin hintaa silloin pudoteta samassa suhteessa kuin se kilohinta, vaan todettiin, että tämä aiheuttaa meille tuotannossa näin ja näin paljon enemmän makulatuuria ja meidän tuotantotehokkuuden putoamista. Jos tämä vaihdetaan näin tämä paperi, niin meidän työn hinta nousee vastaavasti vähän."*
>
> [*"The customer was seeking cost reductions through a change of paper, having checked that the price per ton was more advantageous. We said we would run a trial. The production efficiency dropped significantly, the surface of the paper was weaker than in the previous paper. We couldn't reduce the paper price in the same proportion as the price per ton, but we said that with this paper there would be more waste and our production efficiency would suffer. If you change the paper to this one, the cost of our work will increase a bit."*]
>
> (Production Manager, large printing house)

From the printing house's point of view the most important paper properties are related to the runnability on the printing press, i.e. few web breaks and cumulative problems. The amount of waste should also be low. Dimensional stability is another important consideration, as well as ink consumption. The printing house expects the paper brand to have been fully tested when it comes to the press. It also expects that the raw materials used in paper production will not change, but if they do change that it will be informed. Normally paper producers are quick to inform customers about changes and how they will affect printing.

> *"Kun paperin pinta ei kestä, me joudutaan pesemään konetta välillä ja siihen menee tuotantoaikaa. Se kyllä pyörii koko ajan sen automaattipesun aikana, mutta siinä menee 1000 arkkia hukkaan. Se tarkoittaa myös sitä, että laatu on huonompi, kun se kertyy, niin laatu pikkuhiljaa liukuu alaspäin, sitten se pestään ja laatu nousee taas kohdalleen. Laatu on epätasaisempi. Me pyritään välttämään semmoisten papereiden käyttöä."*

["When paper surface does not withstand printing, we need to clean the press now and then, and this means lost production time. The press continues running throughout automatic cleaning but this wastes 1000 sheets. It also means that the quality will suffer. During the build-up the quality declines, then the press is cleaned and the quality improves again. Quality will therefore vary. We try to avoid the use of such papers."]

(Production manager, large printing house)

Depending on the printing process, paper costs can be up to 60% of the cost of the printed product. There is thus a tendency to reduce costs by selecting a cheaper and lower quality paper. However, a cheaper and weaker paper can cause problems in the printing press and the overall costs might not decrease at all. Magazine delivery costs are the biggest source of costs for the publisher, and lower basis weights are therefore favored. There are trends that affect the favored paper properties: in the 1980s recycling and recyclable papers were important and favored, in the 1990s customers did not want the paper to be too luxurious, and at the beginning of 21st century the paper was expected to be white, stiff and cheap. There have also been signs that, as elsewhere, uncoated paper grades will enter the magazine business in Finland.

5.3.3 Good print quality - license to be in the printing business

In the printing house good print quality means that the variation in print quality is small. Acceptable variation is defined with the customer beforehand and affects the price of the print job. Sample books are used to show the best result that can be achieved with a certain paper brand.

The print result is affected by the original picture, the printing process and the paper. At the printing house the printing process and the paper are often the scapegoats that can be easily accused of causing quality problems. On the other hand, quality control is fairly strict in the printing house and even stricter at the paper mill, and it is easy to present measurement data to show that the printing and the papermaking processes are running according to the specifications. The operator of the printing press will not adjust the process just because of one poor-quality picture – overall quality is more important. Printing houses offer consulting for their customers in the preparation of the original pictures in order to minimize problems from low-quality originals.

"Mehän tehdään joka toinen vuosi – joka kolmas vuosi aika kattava asiakastyytyväisyystutkimus, jota me sitten kyllä analysoidaan. Edellinen tehtiin vuosi sitten ja oikeastaan kaikissa muissa asioissa ollaan parannuttu, mutta yhdessä saatiin pyyhkeitä: kuvien laatu on huonontunut. Hassua siinä on se, että kolme vuotta sitten skannattiin 30 000 kuvaa vuodessa ja edellisvuonna enää 1 500 kuvaa vuodessa eli sinä aikana kun asiakkaat itse rupesi tekemään ne kuvat, me saatiin palautetta, että kuvan laatu on huonontunut. Painokoneella me voidaan laittaa lisää väriä tai ottaa väriä vähemmän, siinä kaikki. Siihen maailmaan liittyy asiakkaan päässä aika paljon osaamattomuutta."

["Every two – three years we carry out a fairly comprehensive survey of customer satisfaction, which we then analyze. The latest was done a year ago and in every area we were performing better except that picture quality was poorer. The funny thing is that three years ago we were scanning 30,000 pictures a year but last year only 1,500 pictures. Customers have started to prepare the pictures themselves, we get feedback that the picture quality has declined. On the printing press we can only increase or decrease the amount of ink, that's it. Customers are not particularly knowledgeable in this area."]

(Marketing manager, medium-size printing house)

It is the printing house's job to handle the printing process. It manages gray balance, for example, through automatic color control and by measuring the quality control strip regularly. If there are quality problems in one sheet, the print quality of the advertisement is given top priority and any adjustments made are based on this. In terms of color management on the press there are two restrictions that should be kept in mind: i) on the press only the amount of ink can be adjusted, and ii) it is not possible to make very local adjustments to the amount of ink. There are different ways of defining the target for print quality. Some printing houses have more standardized production, with profiles for the presses, and the target set for printing is based on these profiles. Other printing houses set targets based on the customer's expectations. For example, if a customer wants colorful pictures, he also gets them, despite the loss of detail in colorful areas.

"Sen pitää vaan näyttää hyvältä. Sitten on kaksi ihan eri koulukuntaa: ne jotka haluaa, että se on densiteetin mukaan ajettu, ja ne jotka haluaa, että on paljon väriä. Meillä on sattumoisin 50 % asiakkaista semmoisia, jotka haluaa paljon väriä. Jos me ajetaan densiteetin mukaan, niin ne lopettaa painamisen täällä. Ne haluaa paljon väriä eli me ajetaan yli kaikkien arvojen."

["It just needs to look good. There are two completely different schools, those who want to print based on print density and those who want to have a lot of ink. Half of our customers want a lot of ink. If we print based on print density, they would stop printing here. They want lots of ink and we print over any values."]

(Marketing manager, small printing house)

Customer complaints are very rare nowadays. For the printing house the only real quality problem in magazine printing today is ghosting. However, printing houses already have ways to avoid it, for example by using an anti-ghosting device. Customers sometimes complain about waviness, but the printers see this more as a feature of the heatset offset process than a fault. Piling is also a serious problem, if it occurs. It is customary these days to print with very tacky inks, which imposes strict demands on the surface strength of the paper. However, customers are not ready to pay for solving problems connected with the paper.

"Vaikka me poistamme yhden ongelman, niin asiakas ei maksa penniäkään enempää siitä tuotteesta, vaikka tämä ongelma poistuu. Meillä ei ole penniäkään hyötyä siitä, se on akateemista puuhastelua. Ei

markkinat sitä kaipaa, se on ihan hyvä sellaisena kuin se on nytkin, vaikka se on ongelmallinen.
Paperihan on tänä päivänä melkein liian hyvä suurimmalta osalta ominaisuuksiaan."
"Even if we solve the problem, the customer is not going to pay any extra for that product. We don't
gain a penny for that, it's academic work. The market doesn't need it; it's quite good as it is now, even
if it is problematic. Papers are almost too good in most of their properties nowadays."]
(Marketing manager, small printing house)

Special features are one way to distinguish a magazine from its competitors. These include varnishing of the covers, the use of extra printing inks, a separate top sheet, half cover, different paper on covers, and unconventional formats. The latter usually mean a large amount of waste paper and thus higher costs. These higher costs can be avoided by changing the press configuration. There are also opportunities in binding and selective binding, e.g. in one case a magazine title has different content versions, and this was also mentioned as a special feature.

5.3.4 Future trends in magazine printing

The printing sector, too, regards the future of magazines as one of the brightest among printed products. However, this area is showing only slight growth. The electronic media are regarded more as supporting print rather than competing with it. The strength of magazines is in targeting, making it a powerful advertising medium.

The weakness of printed products as a whole is that their content cannot be updated. One solution to this might be hybrid media, especially combining the paper world and the mobile world. The key is to find the best features of different products and to combine them in a user-friendly and user-attractive manner.

"Nyt on ollut tilapäinen tilanne, että tietokoneella sä olet voinut saada rajattoman määrän tietoa, jota sä
voit muuttaa reaaliajassa. Mutta mikäänhän ei estä, että paperista voidaan tehdä samanlainen
periaatteessa. Kysymyshän on tehdäänkö se vai ei. Tehdäänkö se kooditeknologian avulla, tehdäänkö se
elektroniikkaa paperilla menetelmällä, ei mitään väliä. Mutta sehän ei ollut se itse peruskysymys vaan se
on itse asiassa se, että ihminen tarvii jotain tietoa. Se haluaa jotain tietoa. Kysymys on vain se, että
mistä hän löytää sen nopeimmin ja kätevimmin."
["We currently have a situation where you can get on your computer an unlimited amount of
information that you can change on-line. But in principle nothing prevents paper from being made to
perform a similar function. The question is, will it be developed or not? Whether it is achieved through
code technology by printing electronics on paper doesn't matter. But that wasn't the main issue, which
is the fact that people need information. They want information. The question is, what is the fastest and
easiest channel for them to find it?"]
(Marketing manager, small printing house)

Printing houses should refocus from production to services, that is consulting and training. There is still scope to develop print quality. The trend is towards smaller numbers of copies even on rotary presses. Technology is already available to print different versions of the same magazine title even with traditional printing technologies. However, digital printing is not yet considered an option in magazine printing due to the high unit price.

"Painon ihmisen pitää nähdä se prosessi vähän isompana kuin että meille tulee pdf ja tuolta se lähtee postiin. Ensinnäkin se konsultaation ja opetuksen rooli. Asiakkaat arvostaa sitä, että ollaan aktiivisesti yhteydessä asiakkaaseen, ilmoitetaan jos aineistossa on jotain häikkää ja opetetaan niitä. Se tietysti tarkoittaa sitä, että pitää ymmärtää sen asiakkaan tarve."

["People at the printing house should see that the process is much more than just receiving a pdf file and then mailing it off. First comes the role in consulting and training. Customers appreciate it when we are in regular touch with them, inform them if there are problems with the materials, and train them. Of course it means that we have to understand the needs of the particular customer."]

(Marketing manager, medium-size printing house)

The trend in magazine papers can be seen in two ways. On the one hand, festive special papers are making a breakthrough, and on the other hand, high-quality uncoated papers can be used in a variety of magazines. In the future, printing houses and their customers might have more ideas for paper development.

"Nyt, kun tämä prosessi on alkanut, ettei anneta pelkkiä tarjouksia vaan annetaan vaihtoehtoja, kun asiakas on kysynyt, ja annetaan vinkkejä. Nyt kun se saa taas muhia viisi vuotta, niin sitten rupeaa tulemaan rohkeita ajatuksia, että ne taas rupeaa vaikuttamaan paperin valmistukseen. Mutta se aika ei ole nyt."

["Nowadays we don't only give quotations but also options and hints. Now it will be left to brew for five years, and after that the bold ideas will appear, which will affect paper production. But that time is not now."]

(Marketing manager, small printing house)

5.3.5 Summary

The role of the printing house in magazine printing is shifting towards services and consulting. The amount of reproduction work done by printing houses today is minimal. Most customers prepare the printed material themselves and send it to the printing house in digital format. CTP technology has replaced the conventional film-based method in the production of printing plates. Customers have also shown interest in taking on a greater role in acquiring the paper. On the one hand, printing houses can concentrate on their core competence – printing. On the other hand, they are willing to use their expertise in pre-press operations and in understanding the requirements imposed on the paper by the printing process. They are therefore willing to offer training and consulting in order to get the best possible result for the printed product. Changes in technology require changes in competence, as reported by Stenvall-Virtanen (2006). However, Pönni (2006) found that the competence of personnel is one of the main success factors for a printing house.

At the moment, price is unfortunately one of the key assets of the printing house. High-quality print is taken for granted, as pointed out in Jernström's doctoral thesis (Jernström, 2000). But there are other ways to ensure survival. One option is to standardize the printing process as fully as possible and thus ensure constant high quality. The other option is to offer the customer different solutions, for example unconventional formats, at a reasonable price. Or these two options can be combined. The key is to have good relationships with customers and to offer them services beyond

technical performance. This is in line with the findings by Pönni and Birkenshaw (Pönni, 2006; Birkenshaw, 2006).

Paper quality in Finland is very high and complaints concerning paper are rare. Paper plays a major role when printing houses are struggling between quality demands and cost pressure. On the one hand, luxurious magazines printed on top-quality paper are seen as very promising products. On the other hand, uncoated papers are becoming more popular in the magazine business. Luxurious magazines also require luxurious pictures, which can be achieved by using tacky printing inks. This means that greater demands are being placed on the paper's surface strength. Good runnability on the press is the most important paper property. The importance of printing efficiency and its contribution to paper runnability were also mentioned by Jernström (2000).

Nowadays printing houses take a minor role, if any role at all, in paper development. The reasons are cost pressure and the fact that good-quality paper already exists. In the future, when more emphasis is placed on offering solutions to customers rather than merely transferring ink to paper, the printing industry can be expected to take a more active role in paper development. Grönlund et al. (2006) also mention collaboration in research and development in the printed product's value network as a success factor in the future.

The attitude towards the future of magazines is positive. The digital media are seen more as supporting print rather than as a competitor. In Pira's research (Anon., 2004a) the finding was the same, but the roles of different media were seen the other way around, i.e. print was seen as supporting the electronic media. New innovative solutions, for example hybrid media, are required in order to generate growth in the printing business. The shift from technical production to consulting and services will be emphasized even more in the future. Contradictory to Birkenshaw (2006), digital printing was not seen as a future technology in magazine printing. The development of traditional technologies towards smaller print runs was seen to be more likely.

6 CUSTOMER REQUIREMENTS FOR PAPER QUALITY IN DIFFERENT PARTS OF A MAGAZINE'S VALUE NETWORK

The requirements placed on the magazine in different parts of the value network were identified from the interviews and categorized based on their contribution to the paper according to Figure 18. The needs were categorized as a) *obviously related to paper*, b) *could be related to paper*, and c) *not related to paper*. Categories a) and b) were linked with the paper properties using QFD. The analysis was performed for each sector separately.
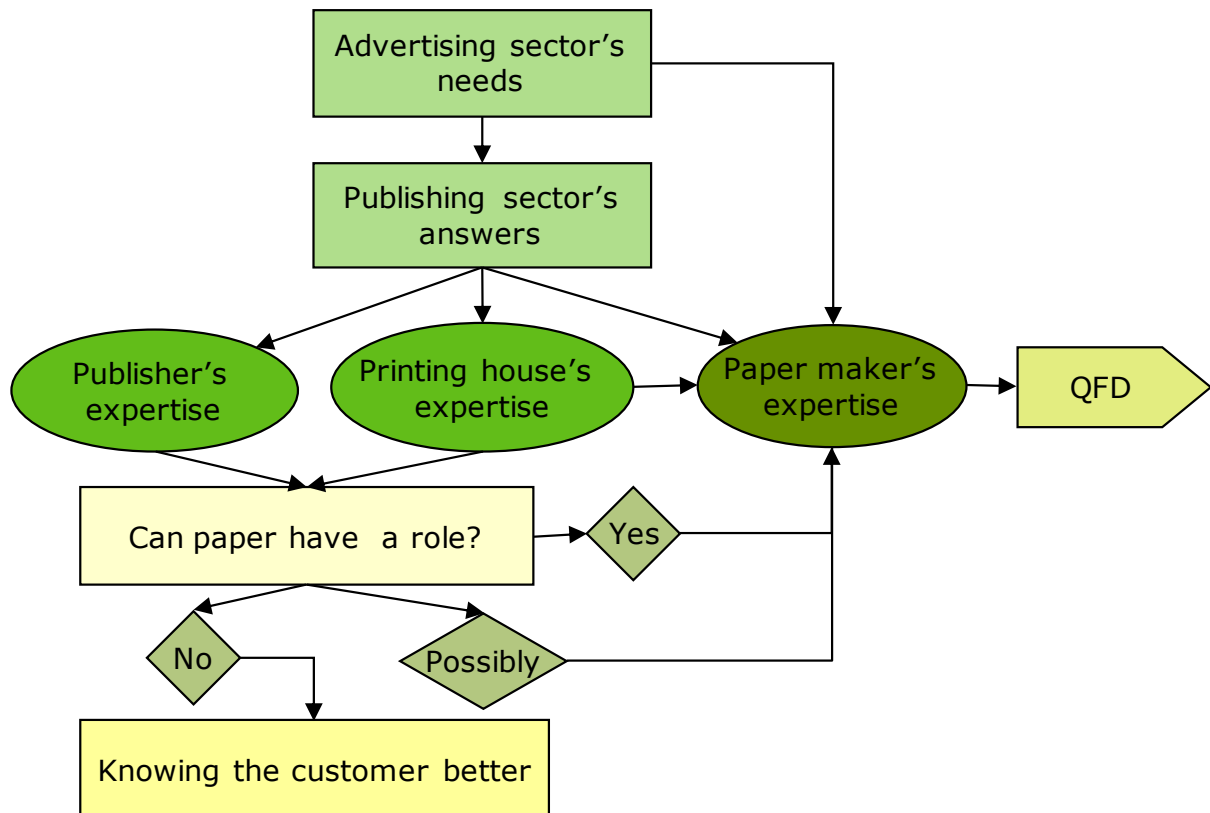
Figure 18. Analysis chain for quality requirements in a magazine's value network.

The paper's quality characteristics deployment chart is presented in Table 8. The paper properties were categorized based on Figure 11 (p. 30) as Symbolic properties, Service properties and properties of the Physical product. The properties of the Physical product, that is paper as *information carrier* and *technical performance*, are the ones that are conventionally used to define paper quality (Haarla, 2000; Suontausta, 1999; Leigh, 2005; Paetow, 2008; Pettersson, 2003; Stoffel, 2004; Glittenberg, 2002; Voas, 1989; Musumeci, 1990; Brewer, 1992). Based on the interviews carried out in this thesis it was clear that there are at least two more categories which define paper quality, i.e. the paper's role in *evoking impressions*, and *service from the paper mills*. Even though the existence of these two categories has been realized (Figure 5, p. 18, Haarla, 2000; Anon., 2002a, Anon., 2002b; Paetow, 2008) only a few systematic methods have been developed for analyzing them (Mensonen, 1996; Aikala, 2003; Forsell, 2004). The paper quality characteristics listed in Table 8 are derived from the literature mentioned in this chapter.

In her master's thesis Mensonen (1996) studied the pleasantness of paper based on visual and haptic perceptions linked with measurable paper properties. In her studies both consumers and professionals evaluated the samples visually and by touching them. Aikala et al. and Forsell et al. (Aikala, 2003; Forsell, 2004) have developed a method for evaluation of the feel properties of paper. This KCL Touch and Feel Method is based on subjective evaluations by a trained testing panel. The method follows the principles of quantitative descriptive analysis, which means that the attributes are selected and defined together with the panelists and the intensities of the attributes are evaluated.

The paper companies M-real and SCA have made efforts to meet end-user and customer requirements. Together with the University of Helsinki's Department of Psychology M-real has studied the role of paper in the reading experience. They found that in addition to visual properties, haptic properties also affected the reading experience: for example thicker, and hence stiffer, paper gives the image of a high-quality product which can even affect the reader's impression of the editorial content (Anon., 2002a, Anon., 2002b; Koskenkanto, 2006). SCA have also used reader expectations on paper quality in their product development (Lyngfeldt, 2004). Alström et al. (2006) at Mid Sweden University studied the publisher's, printing house's and reader's insights on paper. They found that for the publisher it is important that paper supports the message of the magazine's brand. They also found that some readers give considerable attention to the paper. In Alström's study too, tactile properties seem to play an important role in forming the perception of quality.

Table 8 presents the quality characteristics deployment chart for magazine paper. The 1st level quality characteristics are explained with 2nd and 3rd level characteristics. As can be seen, even the 3rd level of a magazine paper's quality characteristics are at a general level that can still be divided into measurable paper properties. However, identification of the links to measurable paper properties is out of the scope of the requirement analysis. The purpose of the requirement analysis is to identify which of these lower level properties are the most important to the customer. The following step in the product development process, product analysis, concentrates on identifying and analyzing the paper properties that enable the paper, among other things, to meet customers' expectations.

Table 8. Quality characteristics deployment chart for magazine paper.

1st level	2nd level	3rd level	
Symbolic	Evoking impressions	-	Impressions related to paper are known
		-	Tactile properties
		-	Sound of paper
		-	Overall visual appearance
		-	Gloss
		-	Whiteness
		-	Visual evenness
Service	Service from paper mills	-	Large paper selection
		-	Flexible service
		-	Reliability of delivery
Physical product	Information carrier	-	Small details visible
		-	Colorful pictures
		-	Even print quality
		-	Natural colors
		-	Opacity
	Technical performance	-	Little wastage
		-	Good runnability on the printing press
		-	No waviness
		-	Color register
		-	No loose pages
		-	No cutting defects
		-	No print defects
		-	Upright magazine
		-	Easy page turning
		-	Paper thickness
		-	Paper weight

6.1 The advertiser's requirements

The requirements placed on magazines by advertisers are listed in Table 9. For the advertiser, reaching the target group is essential and thus the most important properties of a magazine are how well it defines and finds the target group. Next most important is how much attention is given to the advertisement and what kind of feelings it arouses. The advertiser expects the advertisement to fit into the magazine. The third requirement concerns the production of the advertisement and the interaction between the advertising agency and the magazine publisher; that is, the advertisement should be designed for the magazine and the specifications for the advertisement should be available.

Table 9. Advertisers' expectations deployment chart.

1st level	2nd level	3rd level	
Message reaches its target group	Definition of the target group	-	Knowing the reader
		-	Knowing the reading habits
	Reaching the target group	-	Penetration in the target group
		-	Advertisement arouses interest
Advertisement fits into the magazine	Editorial content and advertisements are in line	-	Magazine's image is defined
		-	Constant image
	Magazine's pleasant appearance	-	High-quality paper
		-	Pleasant feel
		-	Brilliant pictures
		-	High-quality printing
		-	Layout beneficial for the advertisement
Advertisement is designed for the magazine	Specifications for the advertisement	-	No limits for imagination
		-	Advertisement's size can be varied
		-	Advertisement's shape can be varied
		-	Versatile colors
		-	Opportunity for special effects

The advertisers' expectations in Table 9 were analyzed according to Figure 18 (p. 63) and expectations that *obviously are related to paper* and that *could be related to paper*, e.g. through brand building, were identified:

- High-quality paper
- Pleasant feel   } Obviously related to paper
- Brilliant pictures
- High-quality printing
- Knowing the reader
- Knowing the reading habits } Could be related to paper

The QFD analysis of the advertising sector's needs is presented in Appendix 3. The correlations between advertisers' needs and paper were estimated and the most important paper properties from the advertiser's point of view were identified and are listed below.

- Impressions related to paper are known
- Tactile properties
- Sound of paper
- Overall visual appearance   } Evoking impressions
- Gloss
- Whiteness
- Visual evenness
- Small details visible
- Colorful pictures
- Even print quality   } Information carrier
- Natural colors
- Color register
- Easy page turning   } Technical performance

Most of these properties are from the categories Evoking impressions and Paper as information carrier (Table 8). The properties from the category Technical performance, that is Color register and Easy page turning (Table 8), are closely related to the visual appearance and feel of paper. These properties are in line with the advertiser's role in the magazine's value network. The purpose of advertisements is to promote the product and they are therefore often evocative. The role of the magazine, and its paper, is to support the advertisement's message. Thus, the expectations placed on the paper are strongly related to sensations either at the symbolic level (for example tactile properties) or to the physical performance of the paper as information carrier (e.g. visual quality). The advertiser's requirements concerning the magazine's pleasant appearance were met quite well. The role of paper in terms of knowing the readers is, at least at the moment, still unclear.

6.2 The publisher's requirements

The expectations of publishers regarding printing houses and paper producers are listed in Table 10. These were categorized into *Symbolic*, *Service* and *Physical product*, according to Figure 11 (p. 30). For the publisher, the service provided by the printing house is the most important requirement. Issues related to a magazine's pleasant

appearance and paper properties, including faultlessness, were the second priority. Appearance depends very much on the paper and the printing. Flexible solutions and the paper's role in supporting the magazine's brand were also emphasized.

Table 10. Publisher's expectations deployment chart.

1st level	2nd level	3rd level
Symbolic	High-quality content	- Paper selected according to magazine's brand
	Magazine's pleasant appearance	- Visual quality - Uniform quality - Colors are correct - Paper is good enough - Adhesive binding - Dispersion varnish on covers - Difference between two pages is critical - Good rendering in advertisements - Perception important - Color gamut is important
Service	Service from the printing house	- Good relationships with the printing house - Good technical facilities - High efficiency - Reliable scheduling - Information on the use of other printing houses - Flexibility in service - Printing house consults in paper selection - Publisher willing to buy the paper in the future - Printer must be satisfied with the paper
Physical product	Paper properties	- No waviness - Brightness development typical - Attractive feel of paper
	Avoiding quality problems	- No ghosting - No cutting problems - No binding mistakes - No register problems - No problems with colors - Little variation in print quality
	Flexible solutions	- Different paper in advertisement - Flexible printing solutions - Added value from hybrid media - Variety of special features

The publisher's requirements in Table 10 were also analyzed according to Figure 18 (p. 63). The expectations that were *obviously are related to paper* and that *could be related to paper* are listed below:

- Paper selected according to magazine's brand
- Visual quality
- Even quality
- Colors are correct
- Paper is good enough
- Perception important
- No waviness
- Attractive feel of paper
- No ghosting
- Little variation in print quality

⎫ Obviously related to paper

- Publisher willing to buy the paper in the future
- Printer must be satisfied with the paper

⎬ Could be related to paper

The publisher's requirements listed above were linked with the paper properties (Table 8, p. 65) using QFD (Appendix 4). The correlations between the publisher's requirements and paper were estimated and the most important paper properties from the publisher's point of view were identified and are listed below.

- Tactile properties
- Sound of paper
- Overall visual appearance
- Visual evenness

} Evoking impressions

- Flexible service from the paper producer
- Reliability of delivery

} Service from the paper mills

- Small details visible
- Colorful pictures
- Uniform print quality
- Natural colors

} Information carrier

- Good runnability on printing press
- No waviness
- No print defects
- Easy page turning

} Technical performance

The publisher's requirements regarding Services were met very well, but quite a number of expectations were not met. These include quality uniformity, both paper and print quality, paper in line with magazine's brand, and ghosting and waviness of the paper.

The paper properties linked with publishers' requirements are from all categories, i.e. Evoking impressions, Service from the paper mills, Paper as information carrier, and Technical performance. These paper properties clearly reflect the role of the publisher in the magazine's value network. Among the symbolic properties, they include properties from service (flexibility and the reliability of paper delivery) and from technical performance. The magazine's brand and content are the publisher's responsibility, but then so are the costs. Thus, the performance of the paper is also of interest to the publisher.

6.3 The printer's requirements

The requirements placed on paper by the printer are listed in Table 11. Again, these were categorized into *Symbolic*, *Service* and *Physical product* based on Figure 11. Magazine publishing is highly dependent on schedules, and the most important expectations of the printing house are therefore linked with schedules, i.e. reliability of delivery and the runnability properties of the paper. Quality issues are considered important in order to be part of the business. Customer service and consulting are becoming increasingly prominent in the printing house's product portfolio, which can be seen in the expectation that the paper should be in line with the magazine's brand.

Table 11. Printers' expectations deployment chart.

1st level	2nd level	3rd level
Symbolic	General criteria in selecting the paper	- Paper in line with magazine's brand
Service	Customer service	- Reliability of delivery
Physical product	Production control	- Detection of roll change
	Quality	- Visual print quality self-evident - Minimal variation - No ghosting - Currently tacky inks (surface strength) - Printing based on profiles
	Paper properties	- Savings in delivery costs - Functioning throughout the process - No sudden change in raw materials - Good color register - Low ink consumption - Small amount of waste - Weaker papers coming into heatset printing - No piling

The printers' expectations listed in Table 11 were linked with paper properties from Table 8 (p. 65) using QFD. The QFD matrix is presented in Appendix 5. For the printer the most important paper properties were:

- Overall visual appearance
- Visual evenness

    } Evoking impressions

- Uniform print quality
- Opacity

    } Information carrier

- Small amount of waste
- Good runnability on printing press
- Color register
- No loose pages
- No cutting defects
- No print defects

    } Technical performance

The printer has high expectations regarding the technical performance of the paper. These expectations are also fulfilled very well. Small amount of waste, Good runnability on printing press, and No print defects were the top three paper properties in the priority list. However, there is one exception: the need for Minimal variation is met poorly with the paper characteristics listed in Table 8 (page 65). Paper as information carrier and, in particular Uniform print quality, were also rated as very important roles of the paper. This was expected, as a well-functioning paper in the printing process is the key element in keeping production costs low. As mentioned earlier, the print quality, in other words the paper's role as information carrier, is the license to be in the printing business and thus important. The properties related to Evoking impressions were also underlined due to their close connection with the printing house's customer service.

The reliability of paper delivery is important for the printing house and this requirement is met very well. Surprisingly, the factors describing Service from the paper producer were not considered important. This might be because the paper properties related to service were very limited (Table 8), as were the services expected by the printers. In QFD analysis the overall importance of the property depends greatly on the number of

customer requirements that it correlates with. The properties in the category Service from the paper mills correlate only with one customer requirement, which diminishes their importance in the analysis. However, some services provided by the paper producer were not discussed at all, for example technical customer service from the paper mills, sample books and sample services.

6.4 Classification of paper properties (Kano model)

Based on the results of the QFD analysis, the different roles of paper in magazines were classified according to the Kano model. The questionnaire was carried out as a web survey. The respondents are listed in Table 12. In the questionnaire, the role of the paper was placed in the same categories as in the QFD analysis (Table 8, p. 65):
- Paper as information carrier
- Technical performance of paper
- Paper's role in evoking impressions
- Service from the paper producer

The questionnaire is presented in full in App. 6. The roles of paper in the questionnaire (App. 6, Table 8) and the quality characteristics of paper in QFD analysis (Table 8) are not one-to-one, following details have been added to the questionnaire. In the category Technical performance of paper, *paper surface not damaged during printing* has been added, in the category Evoking impressions the *tactile properties of paper* are divided into tactile attributes, i.e. *feel of smoothness*, *feel of slipperiness*, *feel of stickiness*, and *feel of stiffness*, and *paper selected according to magazine's brand* has been added. Also, *visual evenness* is expressed in the questionnaire as *paper is uniformly white*, and *overall visual quality* has been left out due to its lack of unambiguity. In the category Service, *printing house part of the paper selection process* has been added. The questions concerning Service were not presented to the respondents from advertising agencies.

Table 12. The respondents of the Kano survey.

Employer	Number of respondents
Advertising agency	4
Publisher	5
Printing house	5
Total	**14**

Based on the results, the paper properties were categorized as *Attractive (A)*, *One-dimensional (O)*, *Must-be (M)* and *Indifferent (I)* according to Table 3 (p. 29). The dominant customer view for each paper property was defined by calculating the number of hits to each category. The properties in the category *Reverse (R)* were changed to their opposites. For example, the property *Paper feels sticky* was located originally in the *Reverse* category. When the property was changed to *Paper feels unsticky*, it could be located in the category *Must-be*. None of the properties fell into the category *Questionable*.

One way to represent the results of the Kano questionnaire is to calculate the *Better* and *Worse* values for the properties and then plot the properties in a Better-Worse diagram. A Better value is a positive number that is the relative value of meeting this customer requirement. A Worse value is a negative number that is the relative cost of not meeting this customer requirement. In the Better-Worse diagram the absolute value of Worse is used. Better and Worse values were calculated according to following equations (Berger, 1993):

$$Better = \frac{A+O}{A+O+M+I} \qquad\qquad Worse = -\frac{O+M}{A+O+M+I}$$

The Better and Worse values and categories of different paper properties are presented in Table 13 and Figure 19. There were no major differences between the answers from different respondent groups, thus the results of all respondents are handled together. The results of each respondent group separately are presented in Appendix 7.

Table 13. Categorization of paper properties from the customer's point of view.

Paper properties	Better	Absolute value of Worse	Category
Paper as Information carrier			
Small details visible in the picture	0.42	0.67	Must-be (46%)
The pictures are colorful	0.33	0.42	Indifferent (35%)
Colors are natural	0.46	0.92	Must-be (54%)
Print quality is uniform throughout the magazine	0.36	0.86	Must-be (64%)
Paper is opaque	0.43	0.79	Must-be (50%)
Technical performance			
No visible print defects	0.36	1.00	Must-be (64%)
No cutting defects	0.29	1.00	Must-be (71%)
No loose sheets in magazine	0.21	1.00	Must-be (79%)
No problems in color register	0.21	0.93	Must-be (71%)
No waviness in paper	0.21	0.79	Must-be (64%)
Paper's weight is small	0.08	0.08	Indifferent (71%)
Paper is thick	0.33	0.33	Indifferent (43%)
Good runnability on printing press	0.29	0.86	Must-be (57%)
Low amount of waste	0.50	1.00	One-dimensional (50%), Must-be (50%)
Paper surface not damaged during printing	0.21	0.93	Must-be (71%)
Magazine is not sloppy on the shelf	0.50	0.86	Must-be (50%)
Magazine's pages turn easily	0.46	0.92	Must-be (54%)
Evoking impressions			
Paper is glossy	0.00	0.00	Indifferent (50%)
Paper's shade is white	0.21	0.57	Must-be (43%), Indifferent (36%)
Paper is uniformly white	0.14	0.79	Must-be (64%)
Paper feels smooth	0.31	0.38	Indifferent (43%)
Paper feels slippery	0.18	0.18	Indifferent (57%)
Paper feels unsticky	0.14	0.79	Must-be (64%)
Paper feels stiff	0.79	0.64	One-dimensional (57%)
Pages turn silently	0.15	0.31	Indifferent (57%)
Paper selected according to magazine's brand	0.43	0.57	One-dimensional (29%), Must-be (29%), Indifferent (29%)
Impressions related to paper are known	0.80	0.50	Attractive (40%), One-dimensional (40%)
Service			
High reliability of paper delivery	0.50	1.00	One-dimensional (50%), Must-be (50%)
Flexible service from the papermaker	0.50	0.90	Must-be (50%)
Large paper selection	0.75	0.63	One-dimensional (50%)
Printing house is part of the paper selection process	0.38	0.25	Attractive (30%), Indifferent (30%)
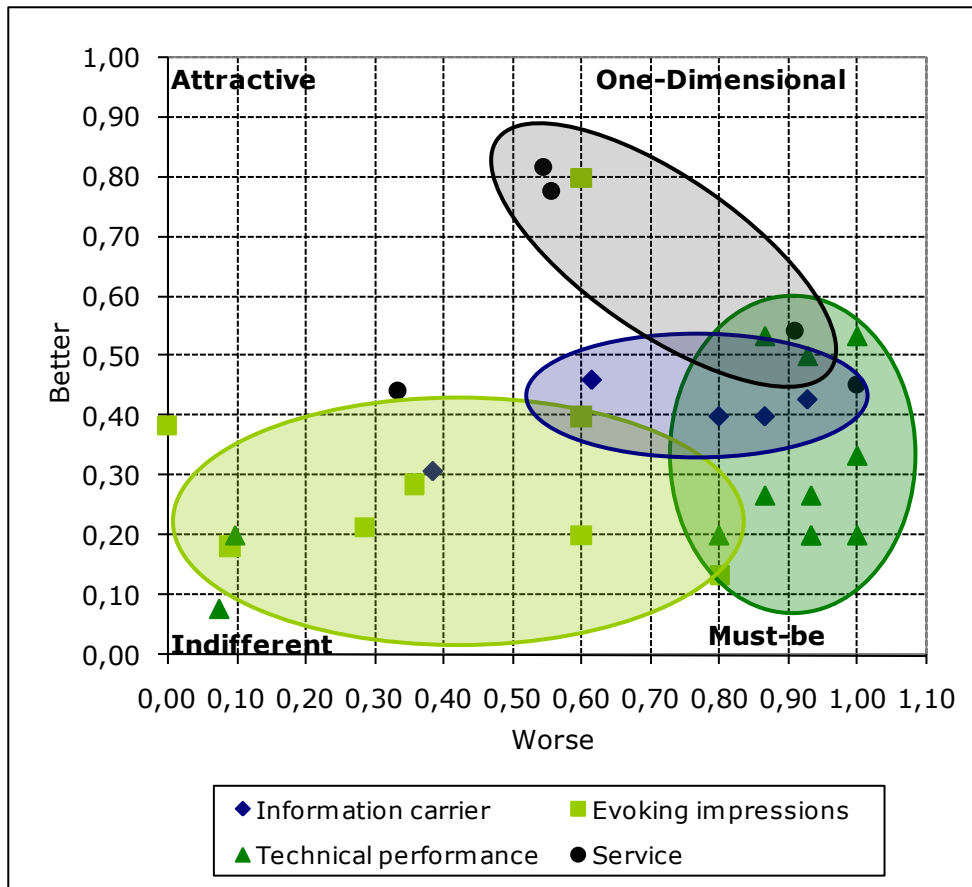
Figure 19. Classification of paper properties from the customer's point of view based on Kano's theory.

Figure 19 shows that most of the paper properties in question are categorized from Indifferent to Must-be. There are some One-dimensional properties but hardly any Attractive ones. This can be explained by the fact that paper is a mature product, and hence most of the properties considered here have had time to move towards the Must-be category.

Most of the properties belonging to the categories Technical performance and Paper as information carrier are rated as Must-be. These categories support the physical aspect of the product image. Some of the properties in these categories are not solely dependent on paper, for example no cutting defects. There is at least one property – Magazine's pages turn easily – which is clearly Must-be but which is rather difficult to measure.

Service from the paper producer is categorized as one-dimensional. This indicates that improving the service might increase customer satisfaction. However, it should be kept in mind that the questionnaire included only three questions concerning services.

The properties in the category Evoking impressions were placed into all classes. Most of the sensory properties were classified as indifferent, however White shade of paper and Feel of unstickiness were rated as Must-be properties. Feel of stiffness and High opacity were classified as One-dimensional. The paper property Knowing the impressions that are related to paper is the only attractive paper property identified. The properties that belong to the category Evoking impressions support the symbolic aspect of the paper's

product image. Thus, it is reasonable that as the respondents represented different parts of the value network, they were not unanimous in their evaluations and that the properties are scattered throughout Figure 19.

6.5 Summary

Based on the interviews and QFD analysis there are differences in the expectations placed on the paper in different parts of a magazine's value network. Jernström (2000) also noticed this when she studied the publishing and printing sectors. In the advertising sector, expectations concern the appearance of the paper and its scope for evoking impressions. In the publishing sector the impressions are important as well, but there economic aspects come into the picture and impose some limitations on expectations. The technical performance of the paper is also important. The publisher selects the paper for his magazine, and hence the service obtained from the papermaker is also valued. In the printing sector the technical performance of the paper and its role as information carrier are underlined.

Fulfilling the expectations in different parts of the magazine's value network varied. Based on the QFD analysis, the advertisers' expectations concerning the magazine's target group were not met. The role of the paper in this respect is thus currently unclear. The printing sector expects paper deliveries to be reliable and, according to QFD analysis, it is. However, the paper characteristic Reliability of delivery was not rated as important. The need for uniform paper quality and uniform print quality were very highly valued by both the publishing and printing sectors. However, there were obvious shortcomings in meeting these needs.

The Kano survey showed that most of the paper properties concerning the technical performance of paper are classified as must-be properties. Properties that define paper as information carrier are either must-be or one-dimensional, which means that they are simply proportional to how functional the paper is and to how satisfied the customer is. The services from the paper producer are also classified as either must-be or one-dimensional. Most of the paper properties concerning evoking impressions are indifferent to the customer. However, there is one property that is attractive, i.e. the customer is more satisfied when the product is more functional but is not dissatisfied when the product is less functional, in the category evoking impressions – knowing the impressions that are related to paper. This is the only attractive property of paper found in this study.

The results of the Kano questionnaire differed to some extent from the results of the QFD analysis. First of all, there were no major differences between the sectors in the magazine's value network. Second, the importance of traditional paper properties, i.e. technical performance and information carrier, were over-estimated in comparison with the QFD analysis. These differences can be partly explained by the small number of respondents in the Kano survey. Analyzing the results of the different parts of the magazine's value network separately can be utilized as the sensitiveness analysis. Thus, the small differences detected between the sectors can indicate that the results are already reliable with this sample. Another reason for the differences between the QFD

analysis and the Kano approach is the nature of the Kano survey, i.e. the respondents had to acquaint themselves thoroughly with the instructions and concentrate on selecting the appropriate alternative. This is not as common in web surveys. Also, surveys describe more the present situation, whereas interviews provide opportunities to consider the issues more thoroughly and evaluate the future.

The differences between the results of the QFD analysis and those of the Kano survey confirm that these two methods have different roles in the requirement analysis. QFD can be used to identify the differences between the sectors in the value network, and the results could therefore be utilized in marketing. The QFD analysis also gives the bases for the Kano survey. The Kano model, on the other hand, can give valuable information for product development by categorizing paper properties into *must-be*, *one-dimensional* and *attractive*. The properties in the must-be category must be kept at an acceptable level, but there is no point in devoting a lot of time and money to developing them much further. Efforts should be directed mainly at developing the one-dimensional properties and the attractive properties.

7 DISCUSSION

7.1 Requirement analysis method

Requirement analysis proved to be an effective tool for taking the customer's perspective into account right at the beginning of the product development project. The results achieved in the case study on magazines were promising; however, the findings can be considered to be of only a general nature. The results would be better utilized if the case product had been even more focused, e.g. a specified magazine title. However, the objective of the study was to test the method, and thus more specific focusing was not needed in this case.

The data was gathered by interviewing several representatives in each part of the magazine's value network. The semi-structured interviewing method was used. The interviews were analyzed as group work using affinity diagrams. Semi-structured interviewing was selected because the aim was to let the interviewees use their normal language while describing a magazine's quality and the paper's role in it. The interviewer was not involved in any part of the magazine's value network, and it was assumed that this would enhance the objectivity of the results. One of the targets was to determine how big a role paper plays in building a magazine's quality from the customer's point of view. The results showed that many of a magazine's quality aspects are to some extent dependent on paper properties. In some cases it was fairly difficult to understand what the interviewee really meant when describing paper properties. It might have been possible to overcome this problem if paper samples had been presented to the interviewee and a suitable interviewing method, e.g. repertory grid (Tan, 2002) or laddering (Grunert, 1995), had been used together with it. However, such a procedure might have over-emphasized the role of paper in a magazine's quality and hence it was not used. The interviews were analyzed as group work in order to minimize subjective interpretations of the data.

The QFD method was employed to link customers' requirements for a magazine's quality with paper characteristics. The different parts of the value network were linked together using the Four Phase approach of the Houses of Quality, in which the prioritized technical responses of the previous production step are used as customer requirements for the following production step. Linking the different sectors together makes it possible to identify those customer requirements that are not obviously related to the paper but which paper might play a role in fulfilling. The priorities given to customers' requirements were assessed based on the interviews: for example, how often a certain requirement was mentioned, and by how many interviewees. The reliability would have improved if the interviewees had rated the priorities themselves. The unclear meanings of some customer requirements placed additional challenges on the QFD analysis, as mentioned in the previous paragraph. In addition, the correlations between customer requirements and paper characteristics were evaluated for each sector of the value network separately. Thus, the differences between the sectors in the value network showed up more clearly.

The relative importances of individual paper characteristics differed only a little. This means that the characteristics listed are all relevant, but none was substantially more important than the others. This indicates that paper properties are strongly related to a certain purpose and there are only a few 'general' properties that affect several purposes. As an example, none of the paper characteristics related to Services from the paper mills was rated as important by the printing houses, even though the ranking for service as a customer requirement was high. For the following step in the paper development process, i.e. product analysis, the correlations between paper characteristics should be estimated. Normally the QFD analysis is performed by a team made up of representatives of different company functions, for example sales and marketing, research and development, and production. In this work no such teams were formed, and hence the engagement of different parts of a company could not be evaluated. The challenges in QFD analysis are strongly related to the interpretation of the interviews and identification and evaluation of the customer requirements. This part is the basis for the analysis and should therefore be planned and performed carefully. Developing and interpreting the House of Quality is more straightforward, because the person who performs the analysis is very familiar with his or her own product.

Paper characteristics were classified according to Kano's theory of attractive quality. The classification was based on a web survey covering representatives from the advertising, publishing and printing sectors. The structure of the questionnaire proved to be unclear in some respects to the respondents, and some other method of data collection, e.g. phone interviews, might have been more suitable. Probably due to misunderstandings, the differences between the sectors in a magazine's value network in the QFD analysis were not detected as clearly in the results of the Kano questionnaire. However, the questionnaire made classification of the paper characteristics possible. The results of the Kano questionnaire are obviously closely related to the issues and questions asked. Thus, the interviews and QFD analysis are very important steps prior to a Kano questionnaire if customer requirements and expectations are to be taken into account in product development.

The results were based on a limited number of interviews and answers to the questionnaire. The number of interviews was based on the amount of new information: when no new information was revealed in the interviews, it was assumed that the interviews adequately covered the expectations of that part of the value network. The results were also compared with the literature. However, the number of respondents in the Kano questionnaire was very small and the results may not be considered statistically reliable. However, if the product development project concerned, say, a certain magazine title, the number of respondents would not be significantly higher. The results of the Kano survey agreed quite well with the QFD analysis. Thus, the results of the interviews and QFD analysis are valid in Finland; however, no generalization to other countries and cultures is recommended.

The requirement analysis method is not product-specific and can therefore be utilized elsewhere in the paper business. It can be seamlessly linked to already existing structures of the paper development process. Understanding customer expectations and taking them into account in product development is a generic trend today, and thus the

requirement analysis presented in this thesis is a tool that can be utilized in other lines of business too.

7.2 Quality space of the magazine

Requirement analysis was used to develop a quality space of the magazine based on customers' expectations throughout the magazine's value network. Quality space includes all the product's characteristics that affect the quality experience of the product. The relevance of each characteristic depends on the relationship between the evaluator and the product. Expectations regarding a magazine's quality were correlated with paper characteristics. Based on the results, paper characteristics fit very well into three groups: physical properties, service, and symbolic properties. These groups together form the image of the paper as a product. At the moment, efforts are being directed mainly at physical properties, i.e. Technical performance on the printing press, and The role as information carrier. However, the results suggest that in order to stand out from competitors, both service and the symbolic properties of paper should be emphasized in product development.

Services related to paper were highly valued, especially by the publishers and the printers. However, it is still a bit unclear what kind of services could be offered. Customers are not aware about the possibilities, and therefore cannot specify very detailed expectations concerning services.

The symbolic properties of interest in this research were mainly the sensory properties of paper. Properties linked to a specific company, e.g. the company's reputation, were left out. One of the challenges in improving the symbolic properties of paper is to link together the different worlds of selecting the paper and producing the paper. There are no clear procedures in the paper selection process. Paper quality is evaluated sensorily by looking, touching, listening, and even smelling. However, paper is produced according to specifications and measurements. Finding the links between sensory properties and physical measurements would help to understand the customer's quality expectations.

Another challenge posed by symbolic properties is that they are very much dependent on general trends in society, and hence change as time goes by. The interviews were conducted in 2003-2006, and changes have occurred during that time, for example in technology, in society and in the world economy. The absence of environmental issues sticks out from the results. Only one of the interviewees mentioned environmental friendliness in the future development of paper. However, environmental issues and sustainability are very important today. One example of their importance is J.K. Rowling's decision to have the Finnish version of the book 'Harry Potter and the deathly hallows' printed on German paper because Finnish book paper brands did not have the FSC certificate (Anon., 2008c). Rowling's decision did not take into account the total environmental load, which is probably greater when the paper is shipped from Germany to Finland than when Finnish paper is used. Finnish papers are produced from wood sourced from certified forests, but the certification is licensed by a different authority. The example shows that sustainability is very much a symbolic property of paper, and hence it is the paper producer's responsibility to see that correct information about

environmental issues is supplied to customers and in some cases even to the consumers. Other environmental issues that were not mentioned in the interviews but which are being discussed at the time of writing this thesis include energy saving in the printing process (Anon., 2007). Birkenshaw (2006) also mentions increasing recyclability as a future trend in the magazine business.

Other areas not mentioned in the interviews were advances in printing press automation, and integration of pre-press, press and post-press, i.e. job definition format (JDF). In Birkenshaw (2006) and Anon. (2007) this was seen as the key area in increasing the productivity of the printing press.

The changes in customer requirements during the time this thesis was being written signify that the relevance of the interviews is time dependent. The classification of paper properties based on Kano's questionnaire also depends on time. Thus, the requirement analysis should be repeated regularly in order to identify the need for product development. However, the whole procedure is rather time-consuming, and hence I would suggest that the QFD analysis could be updated based on, say, general trends and normal dealings with the customer. On the other hand, the Kano questionnaire could be carried out more frequently, for example every two years. The changes in the results of the Kano questionnaire could be utilized as an indicator of the need to repeat the requirement analysis as a whole.

In the future, the customer perspective could widen to include readers as well. It would be interesting to take customer expectations into account in the whole product development process as described in Figure 6 (p. 19). Paper companies nowadays operate globally, and information on cultural differences regarding quality expectations is of interest. There is also a need for fundamental research on the link between customer requirements and measurable paper properties.

8 CONCLUSIONS

The aims of this study were to develop a requirement analysis method with which the customer perspective can be included in the paper development process, and to create the quality space of the magazine from the customer's point of view by means of requirement analysis. Requirement analysis is an application of existing methods for gathering, analyzing and interpreting information on the requirements and expectations placed on the product in its value network. The focus in data gathering has been on the end product, i.e. the magazine, and its quality characteristics. In analyzing and interpreting the customer data gathered, the focus has shifted towards paper characteristics and how they can support a magazine's quality characteristics. And further, which paper characteristics are most important from the customer's point of view and how they should be developed in order to achieve greater customer satisfaction.

The quality requirements placed on a magazine vary along the magazine's value network. Close to the reader, i.e. the advertising sector and editors in the publishing sector, the quality characteristics are more related to readership and editorial content. The magazine's appearance also plays an important role. Further away from the reader, more importance is attached to efficiency in the magazine's production. Hence, the magazine concept can be split into three categories: symbolic product, services and physical product. The role of paper in the physical product is quite evident, but in the services and symbolic categories the quality requirements cannot be directly connected with paper properties. However, more links can be detected when paper characteristics are placed in the physical, services and symbolic categories as well.

For the advertiser, the most important quality factors of a magazine as an advertising medium are its readership and editorial content. The definition of target group is changing from age-based to lifestyle-based. The values, attitudes and habits of readers are also of interest to the advertiser. A magazine's appearance, editorial content and advertisements should all convey the same message to the reader. The advertising sector appreciates information about a magazine's image and any changes in it. Competition between national and international magazines is increasing and because of this the trend is towards high-quality magazines. High quality means high print quality and high paper quality.

The publisher focuses on the reader in magazine production. A magazine title is a brand that is supported by the magazine's content and appearance. Advertisers are the other major customer for the publisher, and in addition to appearance and content, information on the target group and penetration into it are offered to the advertiser. The magazine's appearance and high print quality are important for publishers as well. The process from editors to readers should also run smoothly and on schedule. Thus, the efficiency of the printing process and mailing are also of importance to publishers.

The printing house is the final step in magazine production before the magazines are sent to readers. Printing houses are responsible for print quality and schedule, and they therefore appreciate close cooperation with the customer as well as with their suppliers.

Efficiency is important for them, which is why runnability issues are underlined. Printing houses consult publishers in selecting a suitable paper, and therefore need information about changes in paper brands and paper properties.

Figure 20 illustrates the different requirements placed on a magazine's properties in different parts of the value network. The requirements are linked with the corresponding paper characteristics. Different players in the value network emphasize different properties, and this is why different paper characteristics are important in different parts of the value network.
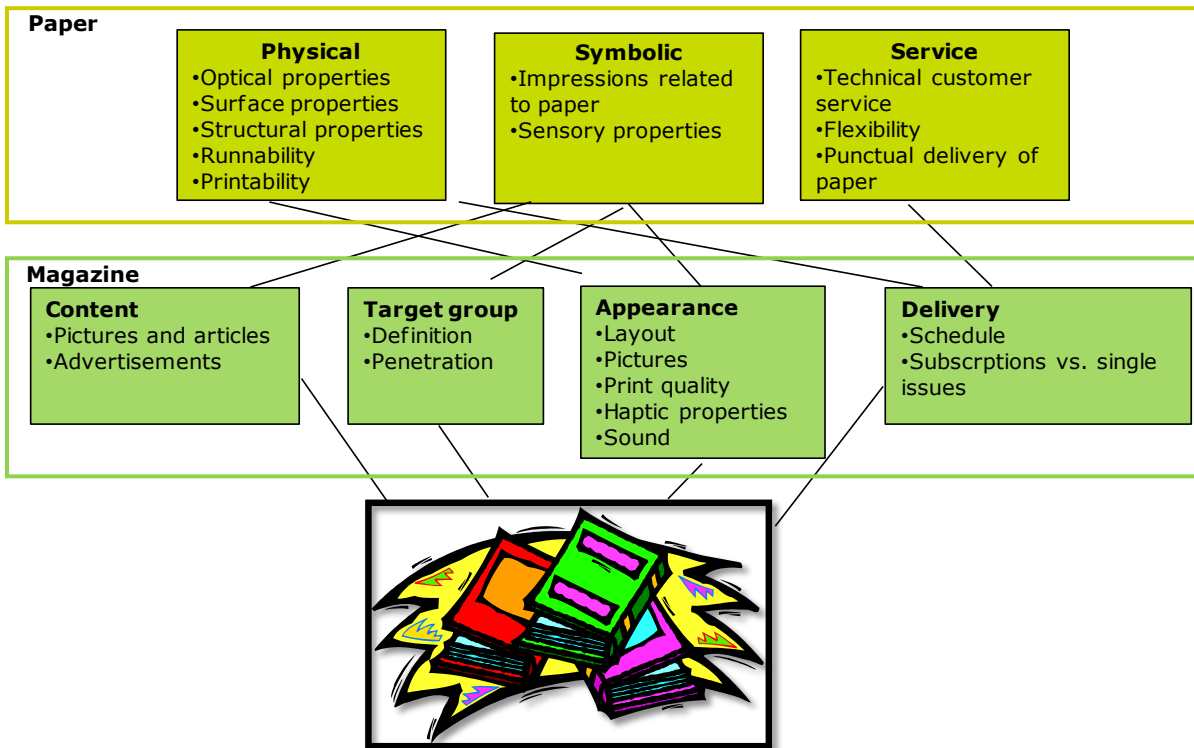
Figure 20. Quality space of the magazine.

The classification of paper characteristics based on customer satisfaction shows that physical paper properties are mostly *Must-be* properties, which means that these features make the customer more dissatisfied when the paper is less functional, but where the customer's satisfaction never rises above the neutral no matter how functional the paper becomes. Service characteristics are either Must-be properties or One-dimensional, where customer satisfaction is simply proportional to the functionality of the product. Some of the symbolic paper properties are attractive to the customer, which means that the customer is more satisfied when the paper is more functional but is not dissatisfied when the paper is less functional; however, most of them fall into the category of properties to which the customer is indifferent. The future will show whether these properties are novel and thus rather difficult to evaluate, or whether they are truly insignificant for the customer. The classification can be used when the targets for the paper development project are set.

Requirement analysis can be fairly easily linked as an initial step to current methodology in the paper development process, i.e. product and process analysis (Figure 6).

Requirement analysis allows the customer perspective to be taken into account systematically. It also provides a way of documenting decisions. Classifying product properties based on customer satisfaction helps in identifying and prioritizing those areas where development work is required. For example, considerable effort has been put into improving runnability on the printing press. However, although runnability issues are very important to customers, they are good enough provided they exceed a certain limit, and they are expected to be well under control. Improved runnability neither makes the paper more competitive nor allows a higher price to be charged.

The case study showed that requirement analysis is an effective way of gaining information about customer requirements in a product's value network and of linking requirements with paper characteristics. The case study for evaluating the method was performed at a rather general level and the results were also somewhat general. The results would have been more precise and concrete if the end product had been more clearly defined, e.g. a certain magazine title. Requirement analysis could also be a useful tool in developing a totally new end product or a product for a totally new end use.

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LIST OF APPENDICES

APPENDIX 1

Quality requirements in magazines' value chain

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1   Introduction

The competition in the printing industry in Western Europe is tough due to the saturation of the print markets. In Finland the print industry concentrates on the national markets and only a few companies have invested on exporting. Traditionally printing houses compete with the price, which, in the long run, can be harmful for the whole line of business. The print industry needs to invest on the co-operation and networking within the industry as well as with closely related lines of business. The key issue in the survival of the print industry is to offer the services that customers want and need. /1/

Based on the report by Finnish Forest Industries Federation and Finnish Paper Workers' Union /2/ the forest industry in Finland is facing very similar challenges to the print industry. The profitability of the paper companies is weak. There is a severe over-capacity among several paper grades in Europe. The paper prices are low. The report suggests that the research and development in the forest cluster should be shifted towards the end of the value chain, i.e. based on the needs of the consumers and advertisers.

This paper describes the requirement analysis method, which can be utilized as the primary step in the product development process. The aim of the requirement analysis is to take the customer perspective into account already in the very beginning of the paper development. Current product development process in the paper industry is strongly focused on improving the effectiveness of the paper making process as well as enhancing the technical properties of paper. At the moment, the need for product development is strongly technology driven. Customer needs are highly valuated but the practical solutions for taking them into account are not yet developed.

2   Methods

2.1   Data gathering

The information on the important quality requirements of different customer sectors was gathered by interviewing several professionals in each sector of the magazine's value chain. Magazine's value chain is illustrated in Figure 1. The target of the interviews was to clarify the processes in and between different sectors throughout the product's value chain. Furthermore, the aim was to identify the most important requirements set to the product as well as other actors in the value chain. A semi-structured interviewing method (focused interview) was used. Interviewing themes were set beforehand for all interviews, but the actual questions and the order of questions could vary every time. /3/
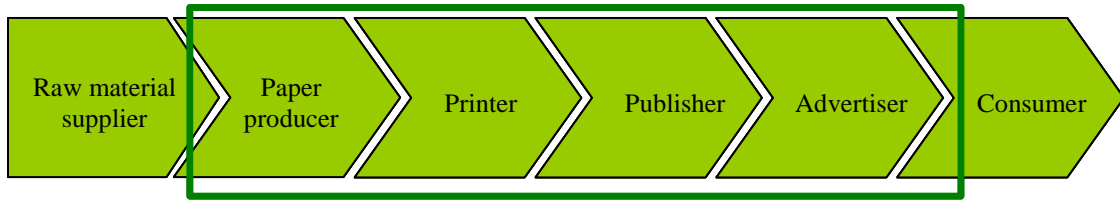
Figure 1. Actors in magazine's value chain.

The interviewees in each sector were selected to represent all actors in the sector. In the publishing sector, the selection criteria included also aspects concerning the size of the publisher and different roles of the professionals. For example, both the business expertise and the journalistic expertise are represented. In the printing sector, the size of the printing house was a variable in selecting the interviewees. All interviewees were Finnish. The interviewees are presented in Table 1.

Table 1. Interviewees in different sectors of magazine's value chain.

Sector in the value chain	Employment	Number
Advertiser	Photographer studio	1
	Reproduction	2
	Advertising agency	4
	Media Agency	2
	Advertiser	2
Publisher	Large publishing company	3
	Small publishing company	2
Printer	Large printing house	2
	Small printing house	2

The interviews were conducted from the following themes:
- Production process in each sector
- Connections with other sectors, responsibilities
- Factors that have effects on product's quality
- Future of magazine publishing

2.2 Linking the customer requirements with product's properties using Quality Function Deployment (QFD)

Quality function deployment (QFD) is a tool for converting the customers' demands into quality characteristics and developing a target quality for the end product. These are achieved by systematically analyzing the relationships between the demands and characteristics starting with the quality of each functional component and extending the deployment to the quality of each part and process. The overall quality of the product will be formed through this network of relationships. The Quality Chart (Figure 2) is the tool used to assist in the conversion of customers' demands to corresponding quality characteristics. Quality Chart is a two-dimensional matrix consisting of a demanded quality chart (Customer Needs and Benefits), combined with a quality characteristics deployment chart (Technical Response). Combining the two matrices expresses the relationships between the qualities and quality characteristics in demand. Planning matrix is used to prioritize the customer needs, the present state of the company and the sales arguments. Technical matrix is for benchmarking the product's behaviour in the market. /4, 5, 6/
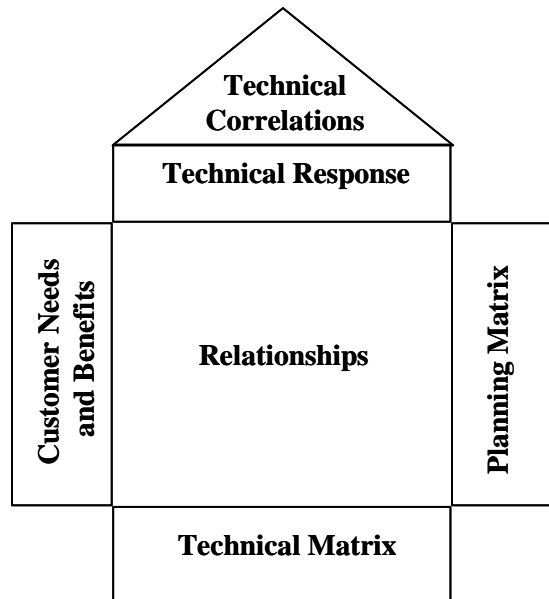
Figure 2. House of Quality /4/

In the requirement analysis the QFD is utilized in linking the needs of the customer sector with the means of the previous sector in the value chain. Different sectors of the value chain are linked together using interrelated QFD matrices, where the technical matrix of the producer will be used as the customer needs and benefits matrix in the next House of Quality. For example, in the first House of Quality the needs of the advertising sector are listed as Customer needs and benefits and the Technical response chart includes the means of the publishing sector. The Technical matrix contains the most important features of magazine publishing based on the advertisers' needs. The second House of Quality contains the needs of the publishing sector listed as the Customer needs and benefits and the Technical response chart includes the means of the printing sector. The third House of Quality contains the needs of the printing sector as the Customer needs and benefits and the Technical response chart includes the means of the paper production sector.

3   RESULTS

3.1   Needs in the advertising sector

In advertiser's point of view the most important quality factors of a magazine as an advertising medium are its audience and editorial content. The definition of target group is changing from an age-perspective to a lifestyle-perspective. Also the values, attitudes and habits of the readers are of interest to advertisers. Magazine's appearance, editorial content and advertisements should convey the same message to the reader. Advertising sector appreciates information about magazine's image and any changes in it. The customer deployment chart of the advertising sector was conducted based on the data from the interviews (Table 2).

Table 2. Advertisers' needs deployment chart.

1st level	2nd level	3rd level
Message reaches its target group	Definition of the target group	- Knowing the reader - Knowing the reading habits
	Reaching the target group	- Penetration in the target group - Advertisement awakes interest
Advertisement fits into the magazine	Editorial content and advertisements are in line	- Magazine's image is defined - Constant image
	Magazine's pleasant appearance	- High-quality paper - Pleasant feel - Luxurious pictures - High-quality printing - Layout beneficial for the advertisement
Advertisement is designed for the magazine	Specifications for the advertisement	- No limits for imagination - Advertisement's size versatile - Advertisement's shape versatile - Versatile colours - Possibilities for special effects

Magazines are a typical example of a product which combines aspects of a physical end product and aspects of service. The physical end product includes the appearance of the magazine - the layout, the printing and the paper. Also the special effects in advertising are included in the physical product. The service part, on the other hand, includes the target group – the definition of the target group, the penetration in the target group, information on how the target group reads the magazine, etc. Also the editorial content is part of the service. In this study, the different roles of magazine were taken into account by dividing the information from interviews in publishing sector into two groups: physical product and service. The groups were analyzed separately. Based on the interviews, the publisher means were deployed according to the quality characteristic deployment chart (Table 3).

Table 3. Quality characteristics deployment chart of magazine publishing.

1st level	2nd level
Magazine as service	- High-quality content - Planned content - Readers
Magazine as physical product	- Information on changes - Appearance - Flexibility in realization

With QFD the correlations between advertiser needs and publisher means were estimated and the most important publisher means in advertiser's point of view were identified. When we consider magazine as a physical product, the most important properties are
- Information on a reform and definition of a reform
- Visual quality
- Picture rendering (dependent on paper properties)
- Picture quality (printing house responsible)
- Feel of paper
- Magazine's layout harmonious
- Flexible choice of paper in advertisements
- Flexibility in printing

These properties can rather easily be linked with paper properties, but when we consider magazine as a service, the links to paper are far from obvious. The most important magazine properties in the case of service are:

- Knowing the reader: databank of advertisements, reader profile, penetration in the target group, national media survey, popularity of articles
- Reader is committed to the magazine
- Content is defined
- Advertisement suits the magazine
- Yearly plan for the content
- Magazine's brand is the basis of the paper selection

3.2   Needs in the publishing sector

For a publisher, the magazine's appearance and high print quality are important. In addition to that, also the process from the editors to the reader should run smoothly and without errors. The appearance of the magazine is affected by the printing process and the paper. Of course the layout and planning of the appearance are important factors, but they are the publisher's responsibility. The appearance and high print quality are defined as visual quality and the feel of paper. Visual quality depends on the reproduction stage, i.e. screening and colour separation, on printing parameters and on paper. The faults in quality are e.g. misregister, differences between two sheets when the picture continues from one sheet to another, hue or colour errors, too much variation in print, ghosting and paper waviness. The feel of a magazine is affected naturally by the paper choice, but also printing has an effect on the feel.

The process from the printing house to the consumer involves the printer, including printing and finishing, paper supplier, other suppliers, and delivery. The problems in this chain include finishing problems, e.g. in cutting and binding and problems in the availability of materials. For example, the printing house may run out of a certain paper. The availability related issues are not negotiable; on the contrary they might be the reason to change the supplier. Table 4 illustrates the customer deployment chart of the magazine publishing.

Table 4. Publishers' need deployment chart.

1st level	2nd level
Service from the printing house	- Good relationships with the printing house - Good technical facilities - High efficiency - Trustworthiness and fast scheduling - Flexibility in service - Long relationship important - One printing house is used - Information on the usage of other printing house - Printing house consults in paper selection - Publisher is willing to buy the paper in the future - Printer must be satisfied with the paper
Magazine's pleasant appearance	- Visual quality - High quality level - Even quality - Colours are correct - The difference between two pages is critical - Perception is important - Colour gamut is important - Good rendering in advertisements - Paper is good enough - Adhesive binding - Dispersion varnish on covers
Avoiding quality problems	- Ghosting problem - Cutting problems are significant - Binding mistakes - Register problems - Problems in colours - Too much variation in print quality
Paper properties	- Waviness is current problem - Brightness development typical - Attractive feel of paper - Paper selected according to magazine's brand
Flexibility for new solutions	- Different paper in advertisements - Flexible printing solutions - Added value from hybrid media - Versatile special features

Printing houses offer solutions for the customer instead of just putting four colours on the paper. For example, they offer consulting in selecting the paper, as well as training in prepress activities. They are willing to take as large a part of the customership as possible. Nowadays customers usually deliver the material in PDF-format and, thus, the printer's role in the beginning of the process has been diminished. However, the printing houses are paying more attention to process and quality control.

Printing house has rather an important role, when a paper brand is selected for the magazine title. In Finland, the publisher defines the paper properties, even the paper brand, but the printing house

consults the customer and also buys the paper. The deployment of quality characteristics of magazine printing is presented in Table 5.

Table 5. Quality characteristics deployment chart of magazine printing.

1st level	2nd level
Customer relationships	- Customer relationship management - Printing house offerings
Workflow in the printing house	- Workflow of the content - Production control - Line of business
Print quality	- Definition of quality - Printer's tools in print quality formation - Colour control
Selecting the paper	- General criteria - Selecting the paper brand - Paper properties
Special features	- Technical solutions

With QFD the correlations between publisher needs and printer means were estimated and the most important means in customer's point of view were identified. The most important properties are

- Customer delivers the material in PDF-format
- Printing house checks the PDF
- Quality control is rather systematic in printing house
- Automatic colour control system
- Quality controls stripe is used to guarantee that process is running smoothly
- Print quality controlled with on-line spectrophotometer
- Closed register control
- Quality tolerances are agreed beforehand
- Printer decides the acceptable deviation in print quality
- Control of grey balance
- Target density is based on printer's experience
- ICC profile of the printing house has been delivered to the customer
- Publisher decides the paper
- Printer consults in selecting the paper
- Tools in selecting the paper: paper samples, printed sample books, dummy magazines
- Pilot printing
- Printing house offers its basic paper selection
- Covers or covering sheet in different paper

4   DISCUSSION

Earlier studies on customer needs in paper industry have concentrated either on the customer's side /7/ or on the paper company's side /8, 9/. In our study we are focusing on linking these two sides together with the requirement analysis method. The requirement analysis presented in this paper is an application of existing methods in a new area. The method is verified with high-quality magazines in Finland. It is typical for method verification that some simplifications are needed, for example in this case the interviews are limited to Finland and the magazine's quality level is specified. However, the method is applicable to other products as well. The requirement analysis method is considered as the initial step in paper development process. Thus, even more focusing would be appropriate in order to achieve detailed information on customer needs concerning a particular product.

The data gathering process with interviews is rather time consuming and requires careful planning. Selecting the interviewees has to be considered thoroughly. In this case the interviewees were professionals in their field and they had a possibility to influence on the decisions concerning co-

operation with other parts of the value chain, for example printing and paper. However, they were not the persons making the final decisions. These criteria were selected in order to get a fresh and simultaneously realistic look on the area. Using different criteria in selecting the interviewees might have influenced the data.

In the requirement analysis the Quality Function Deployment method is applied in quite an untraditional manner. Traditionally the analyzing of the relationships between customer demands and product characteristics starts with the quality of each component and continues to the quality of each process. In our case the components are the properties that the publisher offers to advertisers and the final part is linking the customer requirements throughout the value chain with paper properties. In addition, traditionally the product characteristics are technical properties, but in this case they could be also immaterial goods. This requires interpretation of the data. Due to the application, the QFD matrix and the following conclusions could vary quite a lot depending on the persons constructing the matrix. QFD has been used already earlier in paper industry, for example Jernström /7/ used it in competitor comparison. In our approach QFD is used in finding new paper properties that are relevant for the customers.

According to the results, the services offered to the customer are highly valuated throughout the value chain. However, the role of paper in the service part, especially when we consider magazine as a service for advertisers and readers, remain unclear. "*Paper is selected based on the magazine's brand*." What does this statement mean in real life? The definitions in the magazine's brand are related to images of the product and the reader. These are quite far from the definitions of a paper brand, which are mainly the technical properties of the paper. For a paper producer it would be important to know what kind of images are related to their papers, and further, how these images can be developed. Further research in this field is required.

5   CONCLUSIONS

Requirement analysis is a useful method for taking the customer perspective into account in the paper development process. With requirement analysis, the paper producer gains more knowledge on the customers' business throughout the products value chain and enables the link between customer requirements and paper properties. The requirement analysis can be utilized to help the paper producer offer a suitable paper for a certain end product, as well as producing linking information for the paper development process.

The requirements set to the magazine's quality are different in different parts of the value chain. Advertisers' needs concentrate on the target group and the media environment offered. They describe paper through senses and images that they awake. Based on the advertisers' needs, the magazine concept can be divided into a service part and a physical product. Service means information on readers, their reading habits, values and attitudes. Service means also the definition of the media environment including the magazine's brand, content and image. Physical product includes the appearance as well as the technical production. Publishers' needs are related to the magazine's quality and smooth co-operation with the printing house. Publishers describe papers through their visual properties and overall appearance. Also paper's effects on costs, e.g. paper price and delivery costs, are important for the publisher. Printers appreciate punctuality in the delivery of the content and also technical competence in preparation of the content for printing. Printer's role has changed towards consulting the customer in material preparation as well as in paper-related issues. The most important paper properties for the printers are related to the paper's technical performance on the printing press.

Paper has an important role in communicating the magazine's brand. Customer needs for the end product are valuable information for paper producers in order for them to understand the issues that are valued in the magazine's value chain and should be linked with paper. The challenge in linking customer needs with paper properties is the lack of appropriate knowledge on images related to paper. Also the correlations between measurable paper properties and images are not studied in a comprehensive manner.

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APPENDIX 2

Structure of interviews in the advertising sector

1. Production process of the advertisement: what happens before contacting the advertising agency/media agency?

2. What are the reasons behind selecting a particular advertising agency/media agency?

3. How does the advertiser measure the effectiveness of advertising?

4. What is a good advertisement?

5. What is your attitude towards print media (magazines) as a tool in marketing communications?

6. Does the advertiser have expectations or requirements regarding the choice of media?

7. What are the most important factors in successful advertising?

8. What kind of development paths does marketing communications have in the future?

Structure of interviews in the publishing sector

THEME 1: ACTIVITIES IN THE PUBLISHING SECTOR
1. What kind of process is publishing a magazine issue?
2. What kind of process is publishing a new magazine title?
3. What are the special features of subscribed magazines? What are the special features of single issues?
4. How would you describe a qualitative magazine?

THEME 2: CONNECTIONS WITH ADVERTISERS
5. The target group and penetration in it are the most important quality attributes of the magazine for the advertiser. How are magazine titles marketed to advertisers?
6. The advertiser appreciates accurate specifications in the technical design of the advertisement, on the one hand, and on the other hand they appreciate the possibility to utilize special features (e.g. special shape of the advertisement and supplements). How do you specify the technical parameters of an advertisement?
7. Do you have the same advertisers in added-value services (e.g. web pages) as in the printed magazine?
8. What kind of complaints do you get from advertisements?

THEME 3: CONNECTIONS WITH READERS
9. How do you get an idea of things that please the target group?
10. How do readers complaint about magazines?

THEME 4: CONNECTIONS WITH THE PRINTING HOUSE
11. How do you select the printing house?
12. How do you select the paper?
13. What kind of claims do you make to the printing house?

THEME 5: THE FUTURE OF MAGAZINE PUBLISHING
14. What does the future of magazines look like?
15. What kind of development pressures are there in the magazine's publishing process?
16. What kind of changes will there be in the appearance and content of magazines?

Structure of interviews in the printing sector

THEME 1: THE MAGAZINE IN THE PRINTING HOUSE
1. What is the magazine's production process like from receiving the material to delivery of the ready-made magazine from the printing house?
2. What kind of material flows are there in the printing house?
3. What kind of control and monitoring systems are linked to the printing process?

THEME 2: THE MAGAZINE'S PRINT QUALITY
The visual quality of the pictures is important to the publisher. The publisher also relies on the printing house's expertise in issues related to picture quality
4. What are the factors that affect picture quality and how are they specified for a certain product?
5. What kind of complaints do you get from customers?
Special size of the magazine and the magazine covers enable the magazine to stand out on the shelf. Advertisers appreciate special features.
6. How do you select the format, binding and finish of the magazine? How do they affect operations in the printing house?
7. What kind of special features can you offer to your customers?

THEME 3: CONNECTIONS WITH PAPER MANUFACTURERS
The paper is part of a magazine's overall image and the publisher hopes that the magazine's brand will be taken into account in paper selection. Visual quality is the top priority for the publisher.
8. How is the paper selected for a certain magazine title?
9. How is the paper producer selected?
10. What kind of complaints do you make to the paper producer?

THEME 4: THE FUTURE OF MAGAZINES
11. What does the future of magazines look like?
12. What kind of development pressures are there in the magazine publishing process?
13. What kind of changes will there be in magazine printing?

APPENDIX 3

QFD analysis of advertising sector

			Symbolic							Service		
Product properties			Evoking impressions							Service from the paper mill		
Customer needs		Priorities	Impressions related to paper	Tactile properties	Sound of paper	Overall visual appearance	Gloss	Whiteness	Visual evenness	Large paper selection	Flexible service	Reliability of delivery
Magazine's pleasant appearance	High-quality paper	1		3	3	9	9	9	3			
	Brilliant pictures	3				9	9	9	9			
	Pleasant feel	3	3	9	3		3					
	Good print quality	3				3	9	3	9			
Knowing the reader	Knowing the reader	9	9	3	3		1	1				
	Knowing the reading habits	9		3	3	3	3	1				
	Altogether		90	84	66	72	108	63	57			
	Importance, %		9.53	8.90	6.99	7.63	11.44	6.67	6.04			

| Product properties | | Priorities | Physical | | | | | | | | | | | | | | | |
| | | | Information carrier | | | | | Technical performance | | | | | | | | | | |
Customer needs			Small details visible	Colorful pictures	Even print quality	Natural colors	Opacity	Little maculature	Good runnability on printing press	No waviness	Color register	No loose pages	No cutting defects	No print defects	Upright magazine	Easy page turning	Paper thickness	Paper weight
Magazine's pleasant appearance	High-quality paper	1	9	9	9	9	9									9	1	1
	Brilliant pictures	3	9	9	9	9	3				9			3				
	Pleasant feel	3													3	9	1	1
	Good print quality	3	9	9	9	9	3				9			3				
Knowing the reader	Knowing the reader	9																
	Knowing the reading habits	9																
	Altogether		63	63	63	63	27				54			18	9	36	4	4
	Importance, %		6.67	6.67	6.67	6.67	2.86				5.72			1.91	0.95	3.81	0.42	0.42

APPENDIX 4

QFD analysis of publishing sector

Product properties		Priorities	Symbolic / Evoking impressions							Service / Service from the paper mill		
			Impressions related to paper	Tactile properties	Sound of paper	Overall visual appearance	Gloss	Whiteness	Visual evenness	Large paper selection	Flexible service	Reliability of delivery
Customer needs												
High quality	Paper selected based on magazine's brand	4	9	3	3	3	3	1	3	1		
Magazine's pleasant appearance	Visual quality	7				9	3	3	9			
	High quality level	7	3	3	3	9	9	3	9			
	Even quality	7				3			9			
	Colors are correct	7					1	1				
	Paper is good enough	7		3	3	9	1	1	9	1		
	Perception is important	7	3	9	9	9	3	3	3			
	Attractive feel	4	9	9	9		1					
Quality problems	Ghosting problem	7							1			
	Too much variation in print quality	7				1			9			
	Waviness a problem	7										
Service	Printing house consults on paper selection	10	1	3	3	3	1		3	3	9	9
	Publisher willing to buy the paper in the future	10	3	3	3	3	1	1	3	9	9	9
	Printer satisfied with the paper	10									9	9
	Altogether		154	213	213	352	155	91	415	131	270	270
	Importance, %		2.78	3.84	3.84	6.35	2.79	1.64	7.48	2.36	4.87	4.87

Customer needs		Priorities	Small details visible	Colorful pictures	Even print quality	Natural colors	Opacity	Little maculature	Good runnability on printing press	No waviness	Color register	No loose pages	No cutting defects	No print defects	Upright magazine	Easy page turning	Paper thickness	Paper weight
High quality content	Paper selected based on magazine's brand	4	1	1	3	1	1			3					3	3	3	3
Magazine's pleasant appearance	Visual quality	7	9	9	9	9	3			3	9			3				
	High quality level	7	9	9	9	9	9			9	9	9	9	9	3	9	1	1
	Even quality	7			9				1	1	3			3				
	Colors are correct	7	1	3	1	9	1				1			1				
	Paper is good enough	7	3	3	9	1	3			1				3		1		1
	Perception is important	7	3	3	3	3	3			1				1	9	9	3	3
	Attractive feel	4													3	9	1	1
Quality problems	Ghosting problem	7			9									9				
	Too much variation in print quality	7			9					1								
	Waviness a problem	7								9							1	1
Service	Printing house consults on paper selection	10	1	1	3	1	1	9	9	3	1				9	1		
	Publisher willing to buy the paper in the future	10	1	1	3	1	1	3	3	3	1			3	3	3	1	1
	Printer satisfied with the paper	10	3		3			9	9	3	3			9				
	Altogether		229	213	508	241	157	210	217	277	204	63	63	413	138	221	61	68
	Importance, %		4.13	3.84	9.16	4.34	2.83	3.79	3.91	4.99	3.68	1.14	1.14	7.45	2.49	3.98	1.10	1.22

APPENDIX 5

QFD analysis of the printing sector

Customer needs		Priorities	Impressions related to paper	Tactile properties	Sound of paper	Overall visual appearance	Gloss	Whiteness	Visual evenness	Large paper selection	Flexible service	Reliability of delivery
Product properties			**Symbolic**							**Service**		
			Evoking impressions							**Service from the mill**		
Customer service	Reliability of delivery	9								3	9	9
Selecting paper	Paper in line with magazine's brand	5	9	3	3	3	3	1	1	1		
Paper properties	Savings in delivery costs	4								1		
	Functioning throughout the process	10				3						
	No surprising changes in raw materials	7									1	
	Good color register	7										
	Smaller ink consumption	7										
	Small amount of waste	10						3				
	Weaker papers being used for heatset	8										
	Paper with piling problems avoided	10						3				
Production control	Detection of roll change	2										
Quality	Visual print quality self-evident	10				9	3	3	9			
	Minimal variation	9				9			9			
	No ghosting	5										
	Waviness more a feature than a fault	4				1						
	High surface strength	4										
	Printing based on profiles	4										
	Altogether		45	15	15	216	45	35	236	36	88	81
	Importance, %		1.32	0.44	0.44	6.36	1.33	1.03	6.95	1.06	2.59	2.39

Product properties — Physical

- Information carrier: Small details visible, Colorful pictures, Even print quality, Natural colors, Opacity
- Technical performance: Little maculature, Good runnability on printing press, No waviness, Color register, No loose pages, No cutting defects, No print defects, Upright magazine, Easy page turning, Paper thickness, Paper weight

Customer needs		Priorities	Small details visible	Colorful pictures	Even print quality	Natural colors	Opacity	Little maculature	Good runnability on printing press	No waviness	Color register	No loose pages	No cutting defects	No print defects	Upright magazine	Easy page turning	Paper thickness	Paper weight
Customer service	Reliability of delivery	9						1	3									
Selecting paper	Paper in line with magazine's brand	5	1	1	1	1	3			1					1	3	1	1
Paper properties	Savings in delivery costs	4					3					3			1	1	3	9
Paper properties	Functioning throughout the process	10	1	1	3	1	1	9	9	3	9	9	9	9	3	1		
Paper properties	No surprising changes in raw materials	7																
Paper properties	Good color register	7									9							
Paper properties	Smaller ink consumption	7																
Paper properties	Small amount of waste	10	1	1	3	1		9	9	3	3	3	9	9				
Paper properties	Weaker papers being used for heatset	8					1	9	9	3	3	3	3		1			
Paper properties	Paper with piling problems avoided	10			3			9	9					9				
Production control	Detection of roll change	2																
Quality	Visual print quality self-evident	10	9	9	9	9	9			3				1				
Quality	Minimal variation	9			9						1			1				
Quality	No ghosting	5			3									9				
Quality	Waviness more a feature than a fault	4			1					9	1						1	1
Quality	High surface strength	4						9	9					9				
Quality	Printing based on profiles	4																
	Altogether		115	115	266	115	135	351	369	119	216	156	204	289	47	29	17	41
	Importance, %		3.39	3.39	7.83	3.39	3.98	10.36	10.87	3.50	6.36	4.59	6.01	8.51	1.38	0.85	0.50	1.21

APPENDIX 6

Kano questionnaire

Answers:

1. I like it that way. [*Se ilahduttaa minua.*]
2. It must be that way. [*Niin sen oletan olevan.*]
3. I am neutral. [*Se on minulle yhdentekevää.*]
4. I can live with it that way. [*Tyydyn siihen.*]
5. I dislike it that way. [*En pidä siitä.*]

Questions:
PAPER AS INFORMATION CARRIER

How do you feel, if
1a.   small details of the picture are visible?
1b.   small details of the picture are not visible?

2a.   there is a lot of printing ink in the picture?
2b.   there is a little printing ink in the picture?

3a.   the colors of the picture correspond to reality?
3b.   the colors of the picture do not correspond to reality?

4a.   the print quality is even throughout the magazine?
4b.   the print quality varies in different parts of the magazine?

5a.   the paper is evenly white?
5b.   the whiteness of the paper is mottled?

PAPER'S ROLE IN EVOKING IMPRESSIONS

How do you feel, if
6a.   the paper is glossy?
6b.   the paper is matt?

7a.   the paper is opaque?
7b.   the paper is to some extent transparent?

8a.   the paper shade is bluish?
8b.   the paper shade is yellowish?

9a.   the paper feels smooth?
9b.   the paper feels rough?

10a.   the paper feels slippery?

10b.   the paper feels non-slippery?

11a.   the paper feels sticky?
11b.   the paper feels unsticky?

12a.   the magazine feels stiff?
12b.   the magazine feels floppy?

13a.   the page turns silently?
13b.   the page turns noisily?

14a.   the paper is in line with the magazine's brand?
14b.   the paper is not in line with the magazine's brand?

FUNCTIONALITY OF PAPER

How do you feel, if
15a.   there are no visible print defects in pictures?
15b.   there are visible print defects in pictures?

16a.   there are no cutting defects in magazines?
16b.   there are cutting defects in magazines?

17a.   there are no loose pages in the magazine?
17b.   there are loose pages in the magazine?

18a.   the colors are in register?
18b.   there are mistakes in color register?

19a.   the paper is flat?
19b.   the paper is wavy?

20a.   the paper is light?
20b.   the paper is heavy?

21a.   the paper is thin?
21b.   the paper is thick?

22a.   the paper has good runnability on the printing press?
22b.   the paper causes runnability problems on the printing press?

23a.   there is no significant amount of paper waste from printing?
23b.   the amount of paper waste from printing is considerable?

24a.   the paper surface does not suffer during printing?
24b.   the paper surface is damaged during printing?

25a.   the magazine stands upright on the magazine shelf?
25b.   the magazine collapses on the magazine shelf?

26a.   the magazine's pages turn easily?
26b.   the magazine's pages are difficult to leaf through?

27a.   the paper producer is able to describe impressions related to different paper brands?
27b.   the paper producer is not aware of impressions related to different paper brands?

SERVICE FROM THE PAPER PRODUCER

How do you feel, if
28a.   paper delivery is reliable?
28b.   paper delivery is not reliable?

29a.   the paper assortment is based on customer needs?
29b.   paper assortment is based on the papermaker's needs?

30a.   the paper assortment is large?
30b.   the paper assortment is small?

31a.   the printing house is part of the paper selection process?
31b.   the paper is chosen by publisher and paper producer together?

APPENDIX 7

Results of Kano questionnaire in the advertising sector

Table 1. Categorization of paper properties from the advertising sector's point of view.

| Paper properties	Better	Absolute value of Worse	Category
Paper as information carrier			
Small details visible in the picture	0.67	0.67	Attractive (33%), One-dimensional (33%), Must-be (33%)
The pictures are colorful	0.25	0.25	Indifferent (50%)
Colors are natural	0.25	0.75	Must-be (75%)
Print quality is uniform throughout the magazine	0.00	1.00	Must-be (100%)
The paper is uniformly white	0.00	0.75	Must-be (75%)
Technical performance			
No visible print defects	0.00	1.00	Must-be (100%)
No cutting defects	0.00	1.00	Must-be (100%)
No loose sheets in magazine	0.00	1.00	Must-be (100%)
No problems in color register	0.00	1.00	Must-be (100%)
No waviness in paper	0.00	0.75	Must-be (75%)
The paper's weight is small	0.25	0.25	Indifferent (50%)
The paper is thick	0.00	0.00	Indifferent (50%)
Good runnability on printing press	0.00	0.50	Must-be (50%), Indifferent (50%)
Low amount of waste	0.25	1.00	Must-be (75%)
Paper surface not damaged during printing	0.00	1.00	Must-be (100%)
Magazine is not sloppy on the shelf	0.50	1.00	One-dimensional (50%), Must-be (50%)
Magazine's pages turn easily	0.25	0.75	Must-be (75%)
Evoking impressions			
The paper is glossy	0.00	0.00	Indifferent (50%)
The paper is opaque	0.25	0.75	Must-be (50%)
The paper's shade is white	0.25	0.25	Indifferent (50%)
The paper feels smooth	0.25	0.25	Indifferent (50%)
The paper feels slippery	0.33	0.33	Indifferent (50%)
The paper feels unsticky	0.00	1.00	Must-be (100%)
The paper feels stiff	0.50	0.50	One-dimensional (50%), Indifferent (50%)
Pages turn silently	0.00	0.25	Indifferent (75%)
Paper selected according to magazine's brand	0.50	0.50	Attractive (25%), One-dimensional (25%), Must-be (25%), Indifferent (25%)
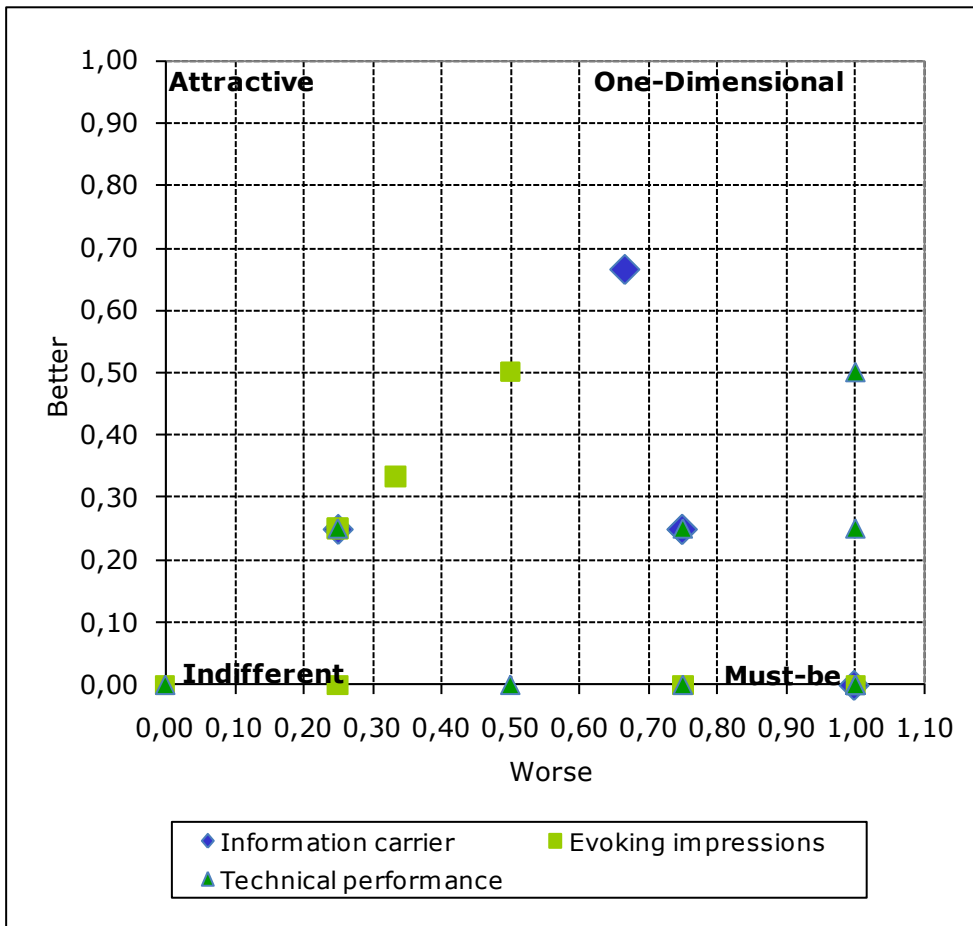
Figure 1. Classification of paper properties from the advertiser's point of view based on the Kano theory.

Results of Kano questionnaire in the publishing sector

Table 2. Categorization of paper properties from the publishing sector's point of view.

| Paper properties	Better	Absolute value of Worse	Category
Paper as information carrier			
Small details visible in the picture	0.25	0.50	Must-be (40%)
The pictures are colorful	0.33	0.67	One-dimensional (20%), Must-be (20%), Indifferent (20%)
Colors are natural	0.20	1.00	Must-be (80%)
Print quality is uniform throughout the magazine	0.40	1.00	Must-be (60%)
Paper is uniformly white	0.40	0.80	One-dimensional (40%), Must-be (40%)
Technical performance			
No visible print defects	0.40	1.00	Must-be (60%)
No cutting defects	0.40	1.00	Must-be (60%)
No loose sheets in magazine	0.40	1.00	Must-be (60%)
No problems in color register	0.40	1.00	Must-be (60%)
No waviness in paper	0.60	0.80	One-dimensional (40%), Must-be (40%)
Paper's weight is small	0.00	0.00	Indifferent (60%)
The paper is thick	0.40	0.80	One-dimensional (40%), Must-be (40%)
Good runnability on printing press	0.20	1.00	Must-be (80%)
Low amount of waste	0.60	1.00	Must-be (60%)
Paper surface not damaged during printing	0.40	0.80	One-dimensional (40%), Must-be (40%)
Magazine is not sloppy on the shelf	0.60	0.80	One-dimensional (40%), Must-be (40%)
Magazine's pages turn easily	0.80	1.00	One-dimensional (80%)
Evoking impressions			
The paper is glossy	0.00	0.00	Indifferent (40%)
The paper is opaque	0.40	1.00	Must-be (60%)
The paper's shade is white	0.21	0.57	Must-be (43%), Indifferent (36%)
The paper feels smooth	0.50	0.50	Attractive (20%), One-dimensional (20%), Must-be (20%), Indifferent (20%)
The paper feels slippery	0.25	0.25	Indifferent (40%)
The paper feels unsticky	0.40	0.80	One-dimensional (40%), Must-be (40%)
The paper feels stiff	0.80	1.00	One-dimensional (80%)
Pages turn silently	0.25	0.50	Must-be (40%)
Paper selected according to magazine's brand	0.40	0.80	One-dimensional (40%), Must-be (40%)
Impressions related to paper are known	0.60	0.60	One-dimensional (40%)
Service			
High reliability of paper delivery	0.60	1.00	One-dimensional (60%)
Flexible service from the papermaker	0.60	0.80	One-dimensional (40%), Must-be (40%)
Large paper selection	0.60	0.60	One-dimensional (60%)
Printing house is part of the paper selection process	0.33	0.00	Indifferent (40%)
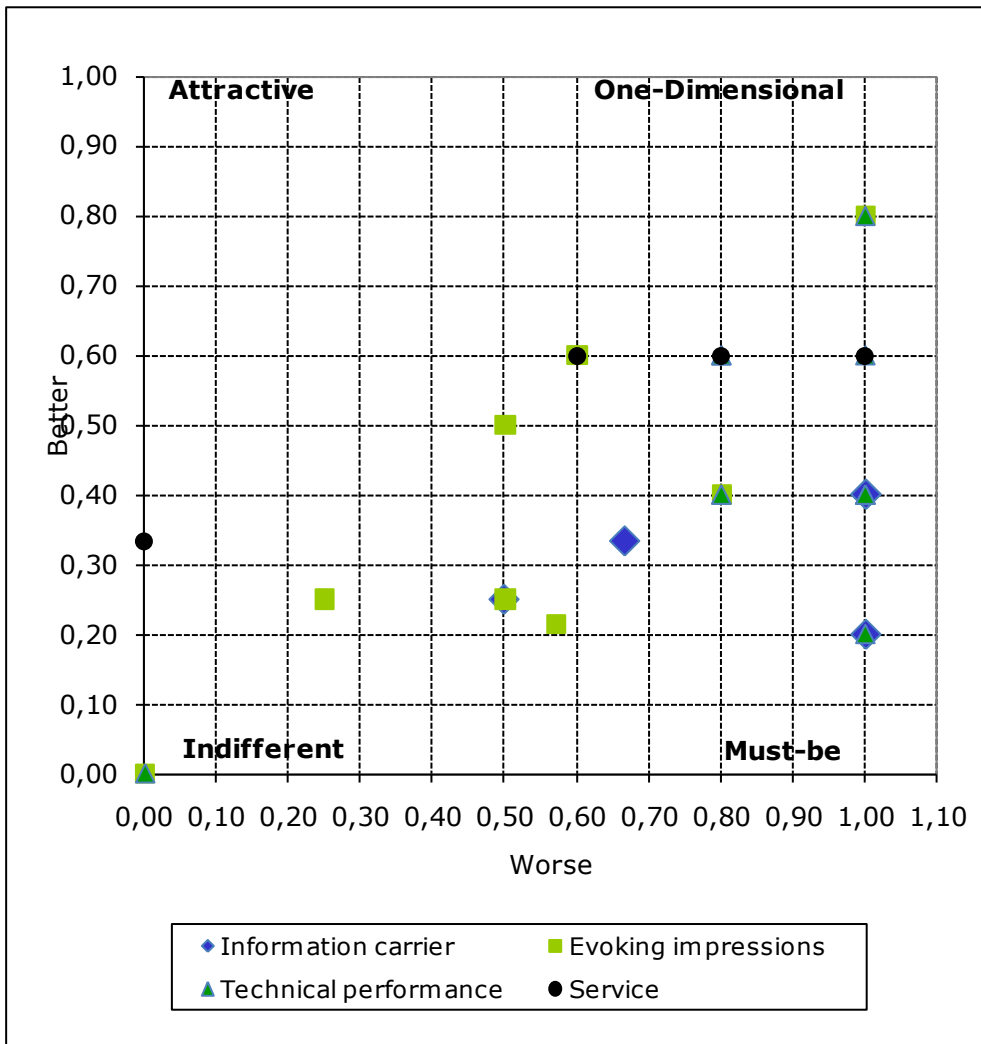
Figure 2. Classification of paper properties in publisher's point of view based on the Kano theory.

Results of Kano questionnaire in the printing sector

Table 3. Categorization of paper properties from the printing sector's point of view.

| Paper properties	Better	Absolute value of Worse	Category
Paper as information carrier			
Small details visible in the picture	0.40	0.80	Must-be (60%)
The pictures are colorful	0.40	0.40	Indifferent (40%)
Colors are natural	1.00	1.00	One-dimensional (100%)
Print quality is uniform throughout the magazine	0.60	0.60	Attractive (40%), Must-be (40%)
The paper is uniformly white	0.00	0.80	Must-be (80%)
Technical performance			
No visible print defects	0.60	1.00	One-dimensional (60%)
No cutting defects	0.40	1.00	Must-be (60%)
No loose sheets in magazine	0.20	1.00	Must-be (80%)
No problems in color register	0.20	0.80	Must-be (60%)
No waviness in paper	0.00	0.80	Must-be (80%)
The paper's weight is small	0.00	0.00	Indifferent (100%)
The paper is thick	0.40	0.00	Indifferent (60%)
Good runnability on printing press	0.60	1.00	One-dimensional (60%)
Low amount of waste	0.60	1.00	One-dimensional (60%)
Paper surface not damaged during printing	0.20	1.00	Must-be (80%)
Magazine is not sloppy on the shelf	0.40	0.80	Must-be (60%)
Magazine's pages turn easily	0.25	1.00	Must-be (75%)
Evoking impressions			
The paper is glossy	0.00	0.00	Indifferent (60%)
The paper is opaque	0.40	0.80	Must-be (60%)
The paper's shade is white	0.00	0.40	Indifferent (60%)
The paper feels smooth	0.20	0.40	Indifferent (60%)
The paper feels slippery	0.00	0.00	Indifferent (80%)
The paper feels unsticky	0.00	0.60	Must-be(60%)
The paper feels stiff	1.00	0.40	Attractive (60%)
Pages turn silently	0.20	0.20	Indifferent (80%)
Paper selected according to magazine's brand	0.40	0.40	Indifferent (40%)
Impressions related to paper are known	1.00	0.40	Attractive (60%)
Service			
High reliability of paper delivery	0.40	1.00	Must-be (60%)
Flexible service from the papermaker	0.40	1.00	Must-be (60%)
Large paper selection	1.00	0.67	One-dimensional (40%)
Printing house is part of the paper selection process	0.40	0.40	Attractive (40%), Must-be (40%)
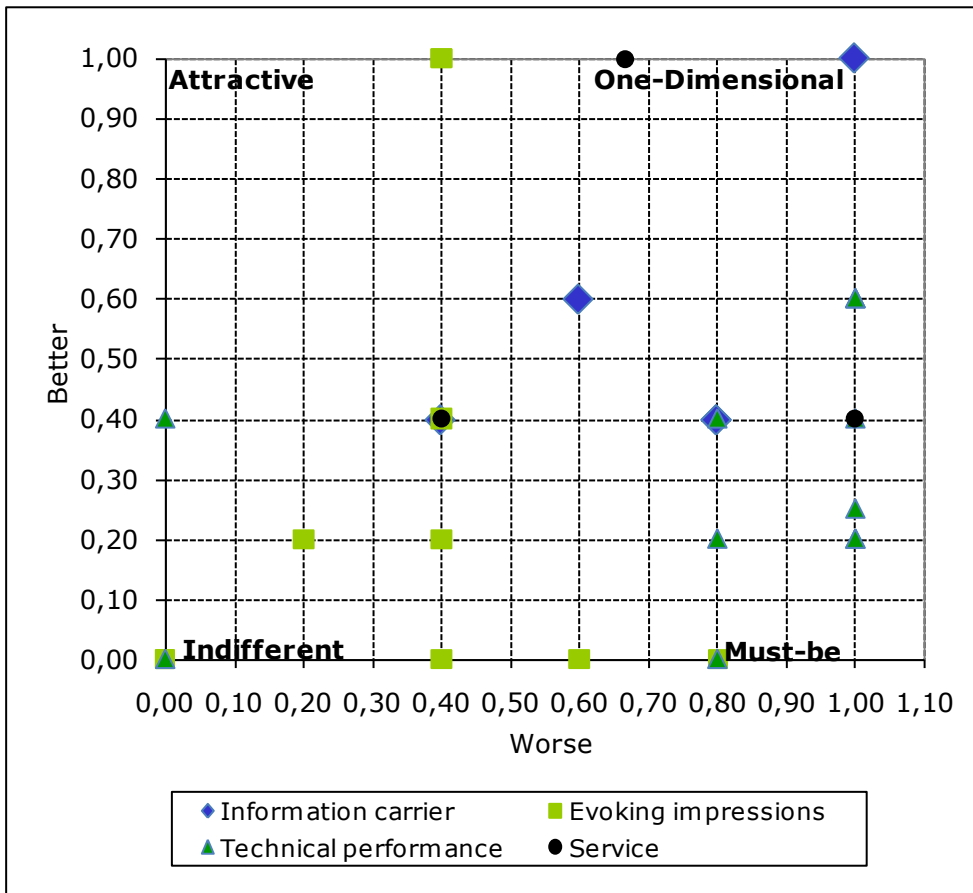
Figure 3. Classification of paper properties from the printing house's point of view based on the Kano theory.